

insects  
in Colour

Blandford Colour Series

# Insects in Colour



Blandford

Edited by N.D. Riley

The insects illustrated and described in this pocket-sized book comprise a cross-section of the common species to be found in the countryside of the British Isles and, for the most part, throughout Europe. Brief descriptions and notes are given for speedy identification of 260 insects, with emphasis on the larger varieties such as butterflies, moths, beetles, dragonflies, wasps, bees, ants and grasshoppers. In addition, there is a useful general outline of the main features of insect anatomy, biology and classification, and a full index, which make this handy volume both a valuable reference book and a basic and thorough introduction to the study of insects.

The English edition had been prepared by N. D. Riley, formerly Keeper of the Department of Entomology, British Museum (Natural History).

# INSECTS IN COLOUR

English Editor  
N. D. RILEY

illustrated by  
EDGAR HAHNEWALD

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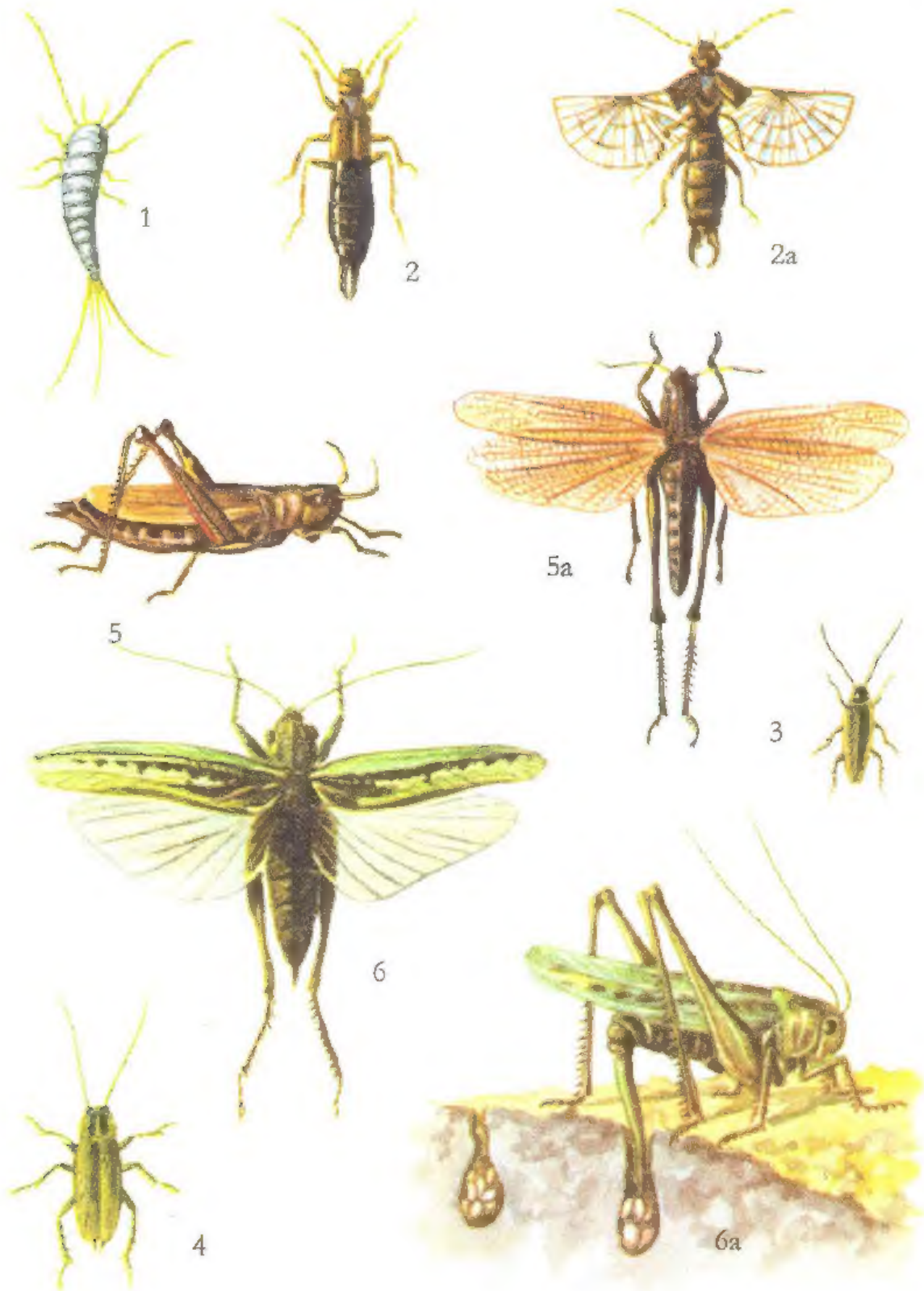
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## FOREWORD

The coloured illustrations of Insects in this book were drawn by the Swedish artist, Edgar Hahnewald, and were originally published in Sweden and Denmark under the titles *Insekter i Färg* and *Insekter i Farver* respectively. The accompanying descriptions were written by Bengt Olof-Landin (Sweden) and Hans Hvass (Denmark).

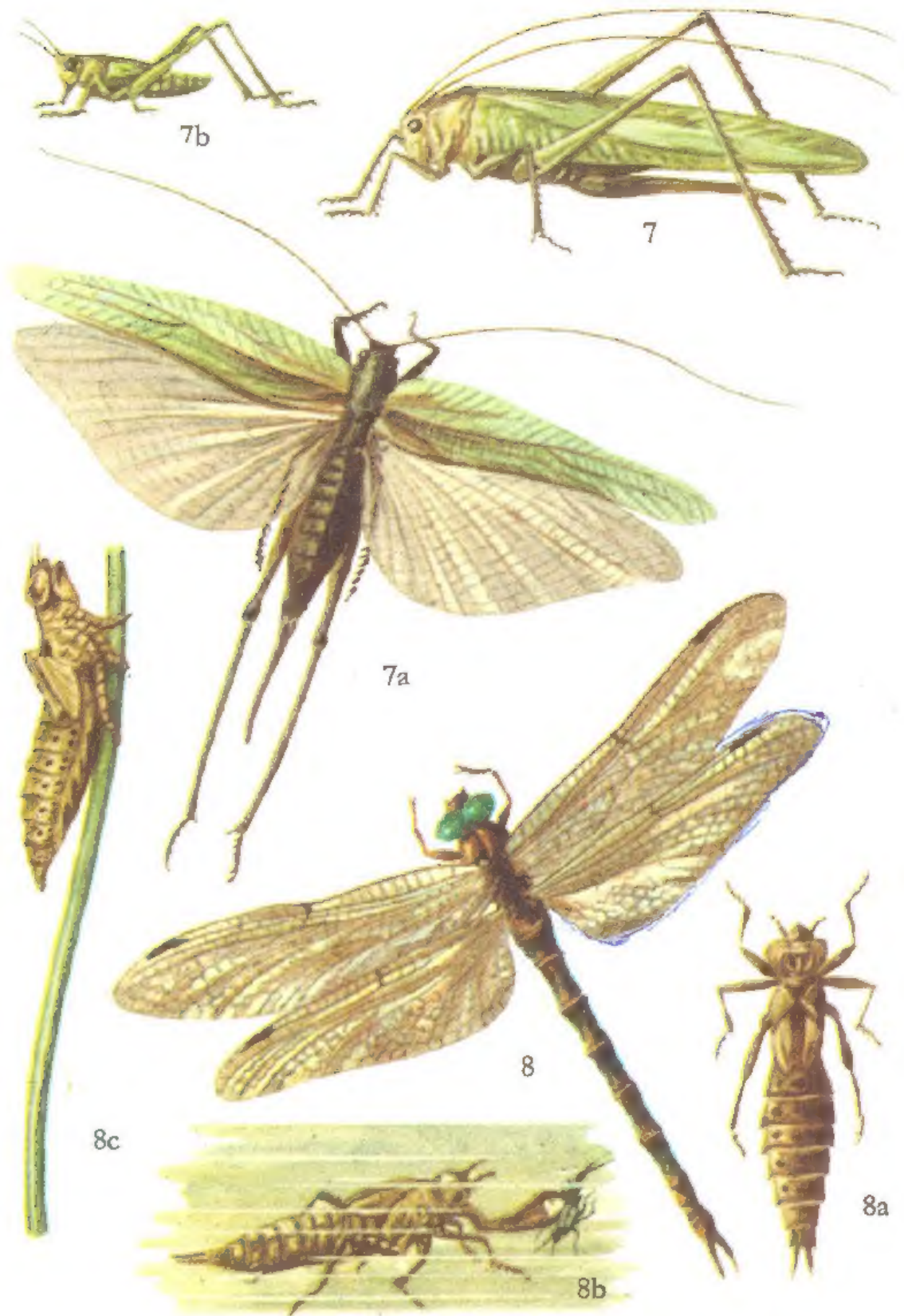
A small number of the insects illustrated in the original editions are not known to be present in the British Isles. These have been replaced by new illustrations, supplied by the artist, of other species which are British. It will be found also that some illustrations remain of species which, though common in Scandinavia, are rare or exceedingly rare in Britain. These mostly occur in the extensive coniferous forests of Norway and Sweden and with the extensive planting of such trees in Britain, may be expected to become less rare.

The book is intended to give a summary cross-section of the commonest insects to be found in the countryside, with deliberate emphasis upon the larger kinds, such as butterflies, moths, beetles, dragonflies, wasps, bees, ants and grasshoppers most likely to be met with. Species typical of most of the less obvious but important groups are also illustrated and several uncommon species have also been deliberately included to illustrate some point of especial interest concerning their habits or occurrence. In all 260 species are figured representing about 4 out of every 300 kinds known to occur in the British Isles. In the brief introduction a short general outline is given of the more salient features of insect anatomy, biology and classification.



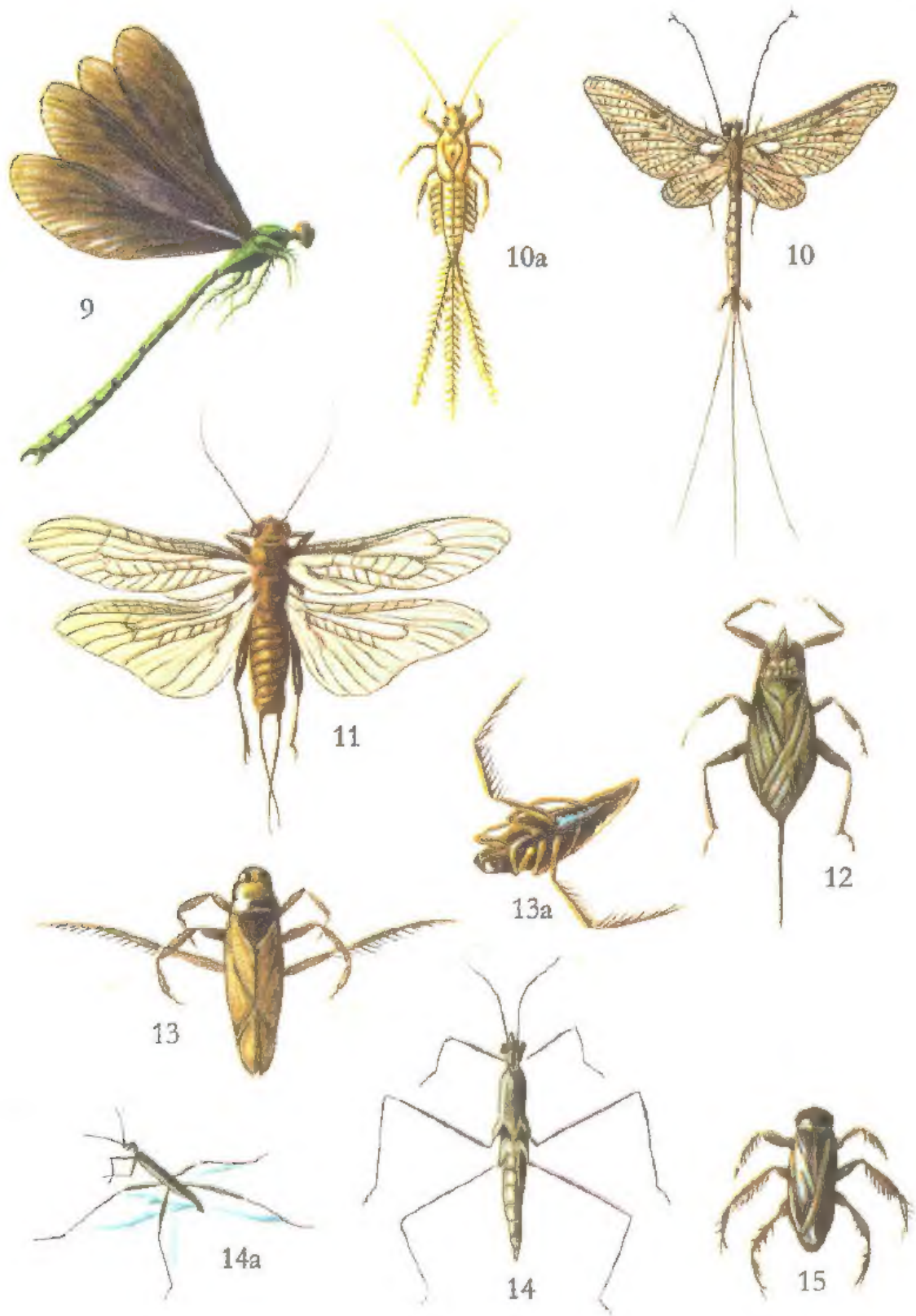
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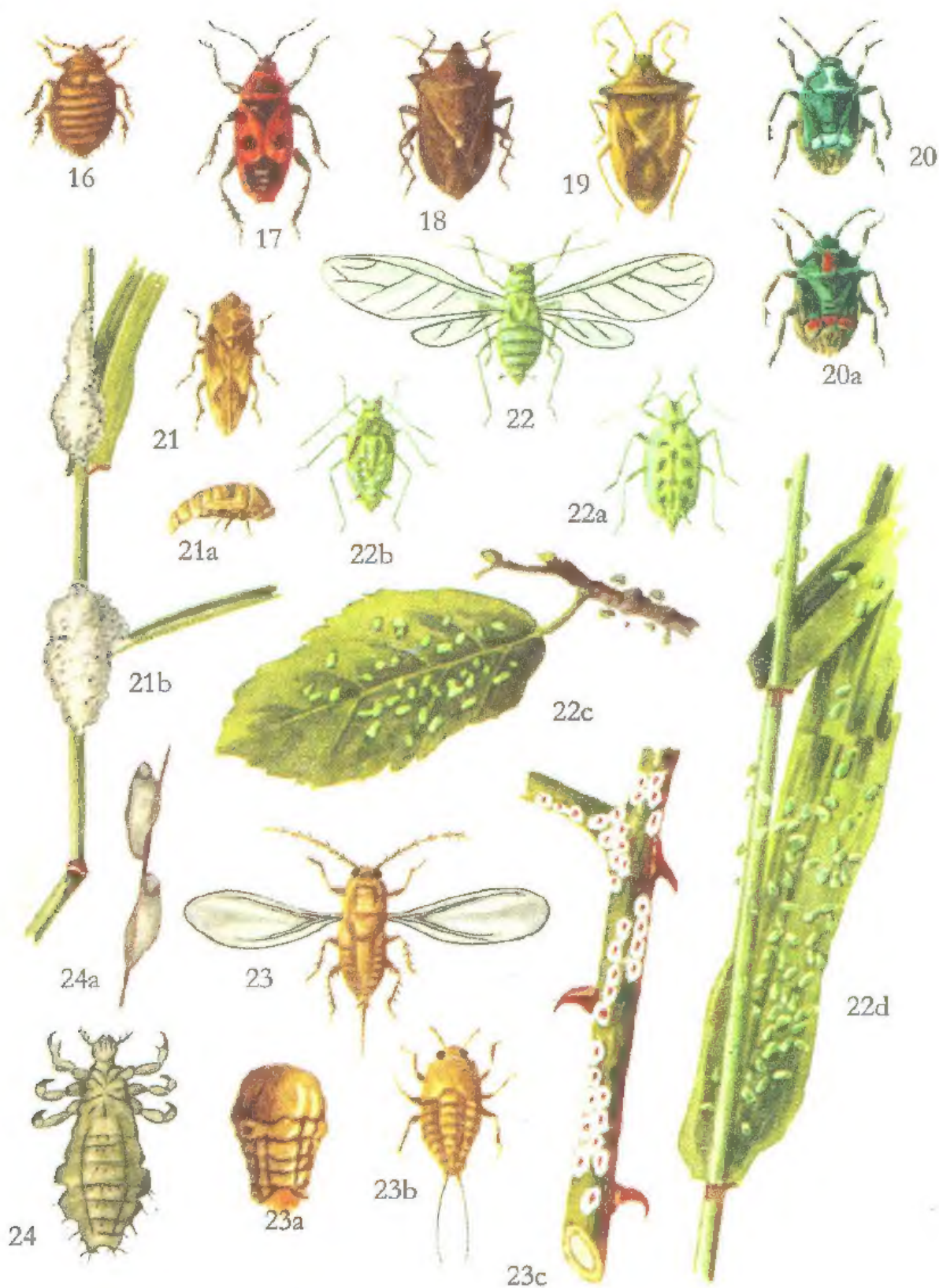


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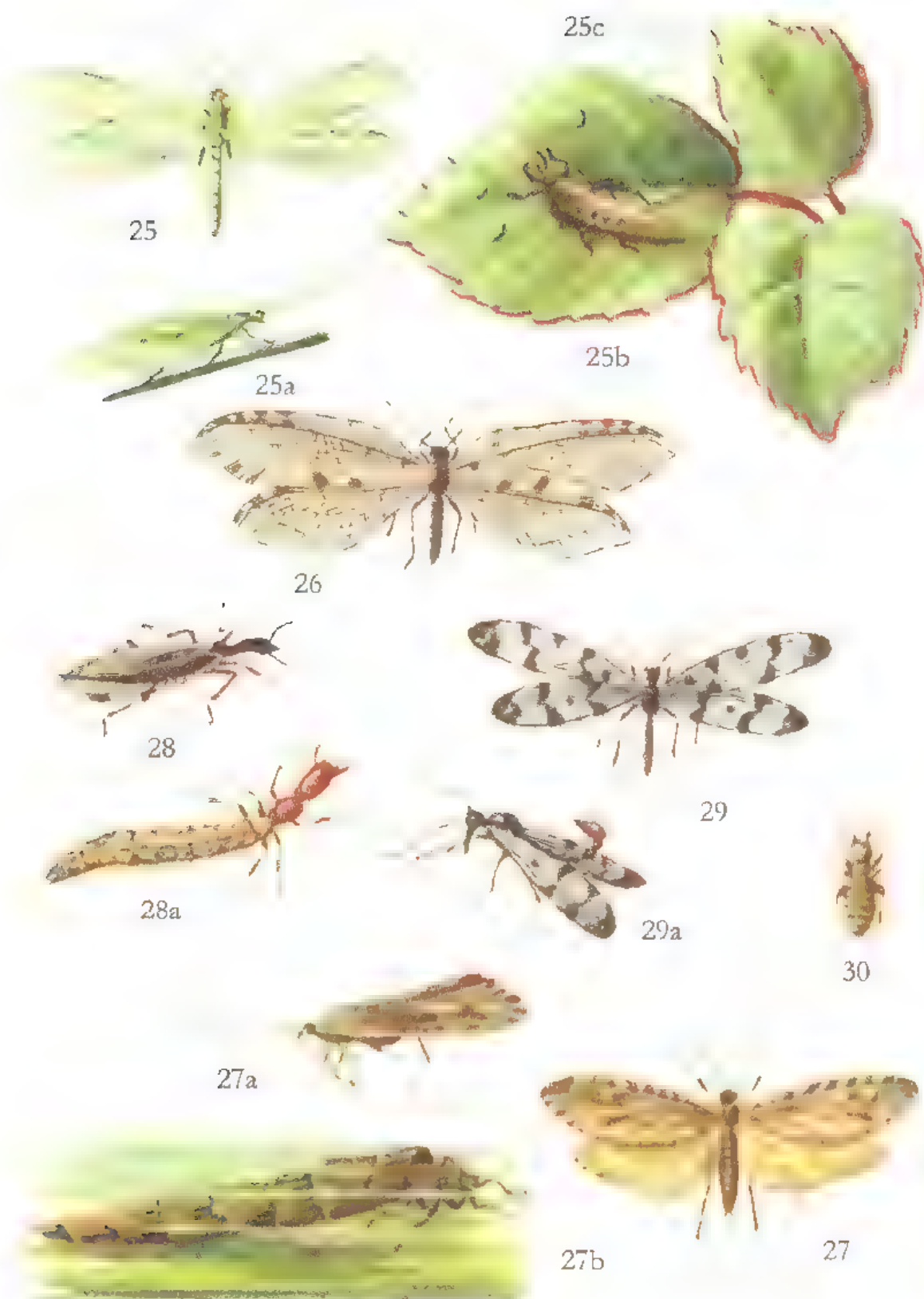




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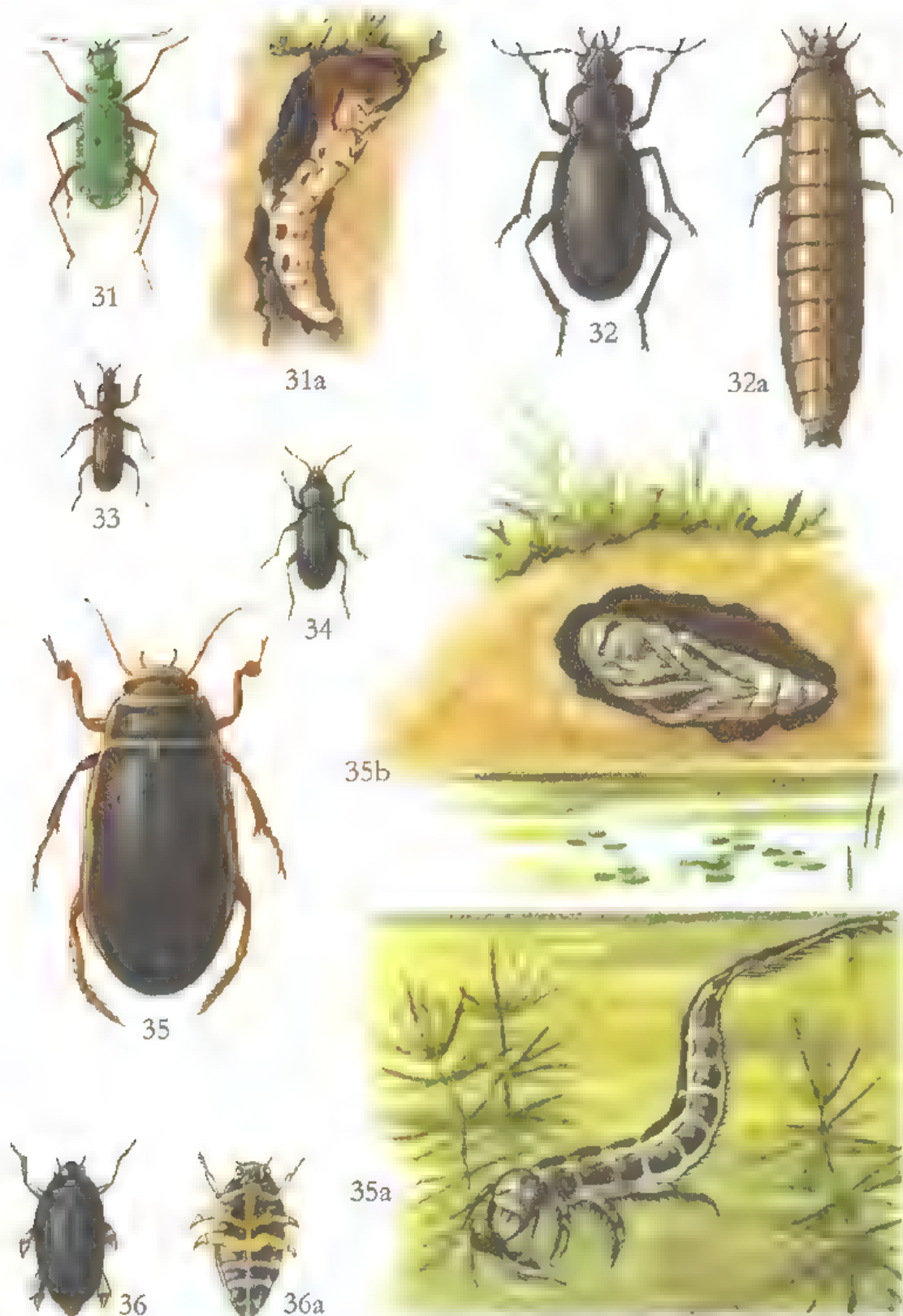


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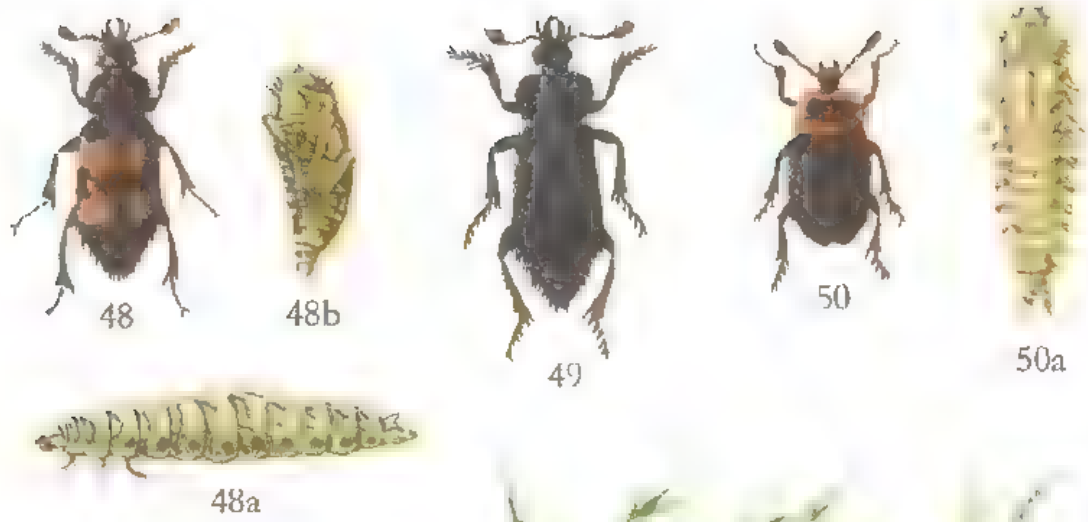




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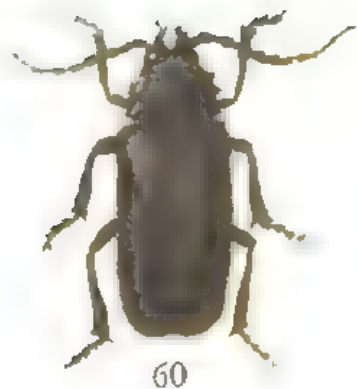
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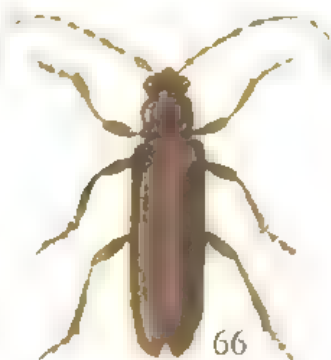
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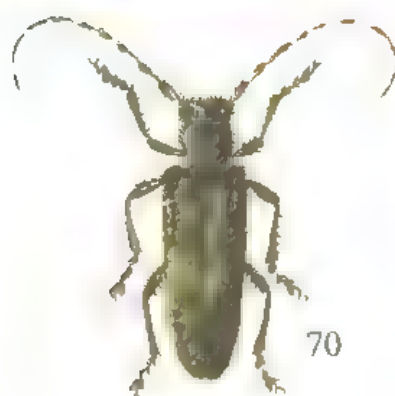
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69a



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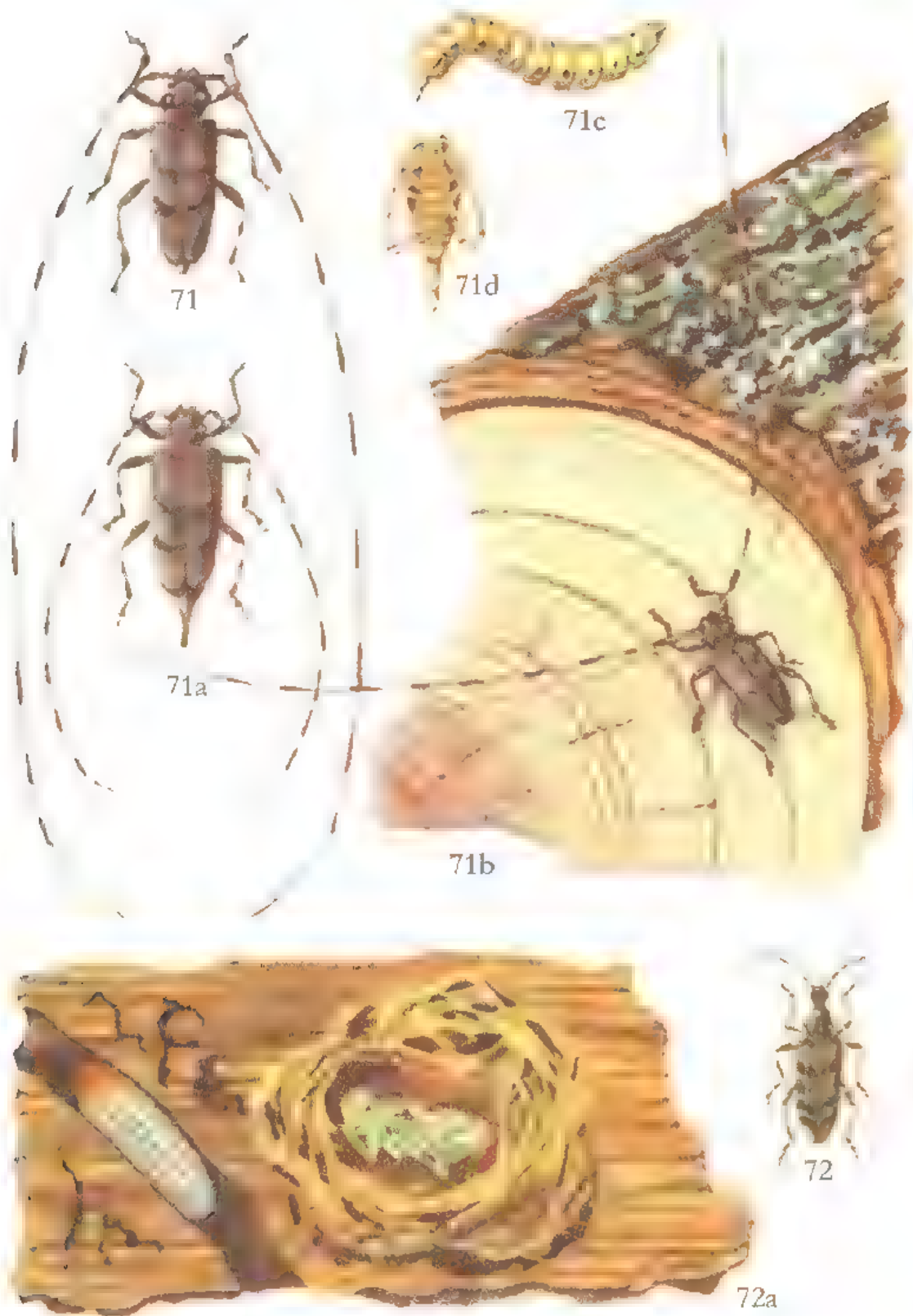
70a



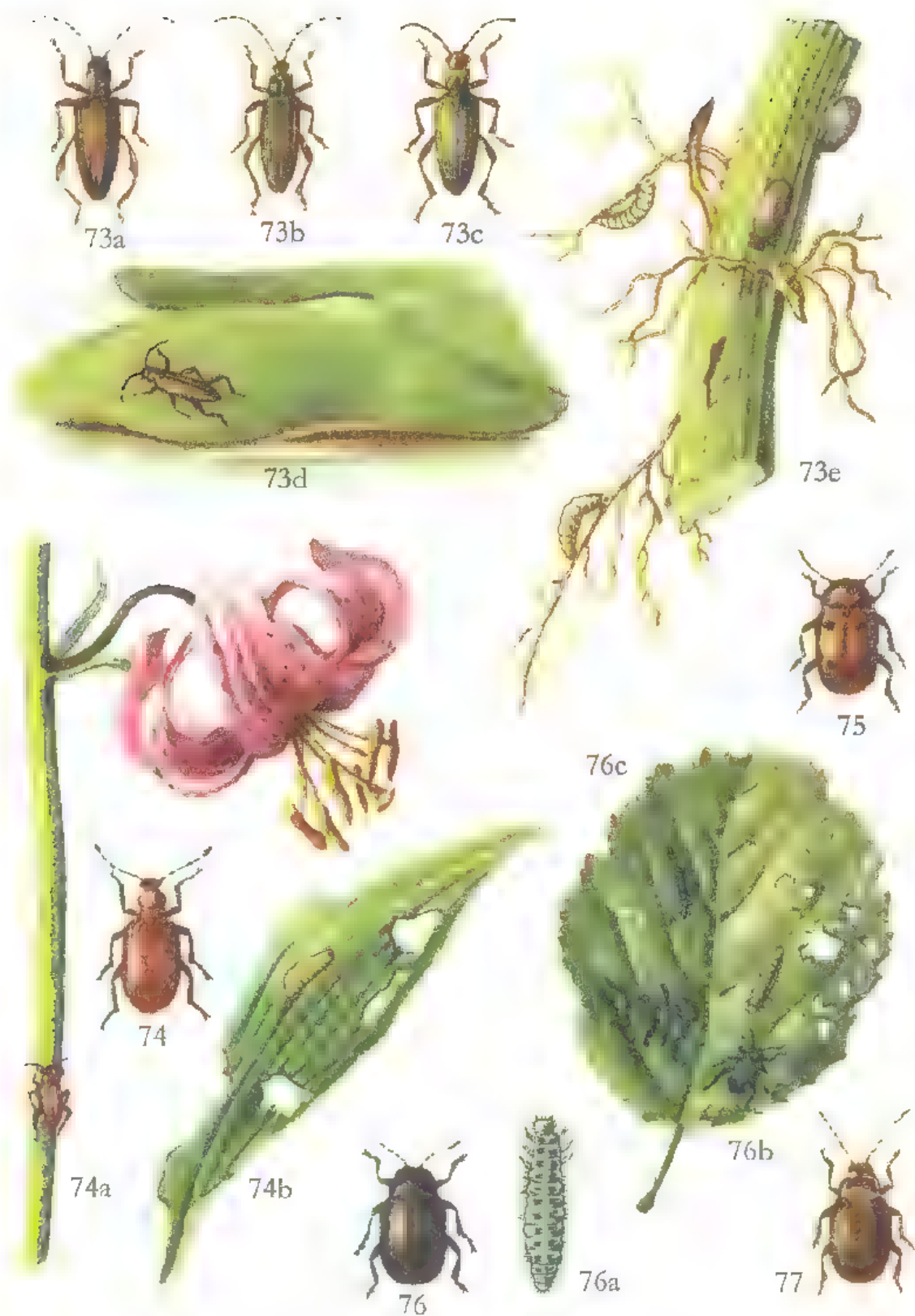
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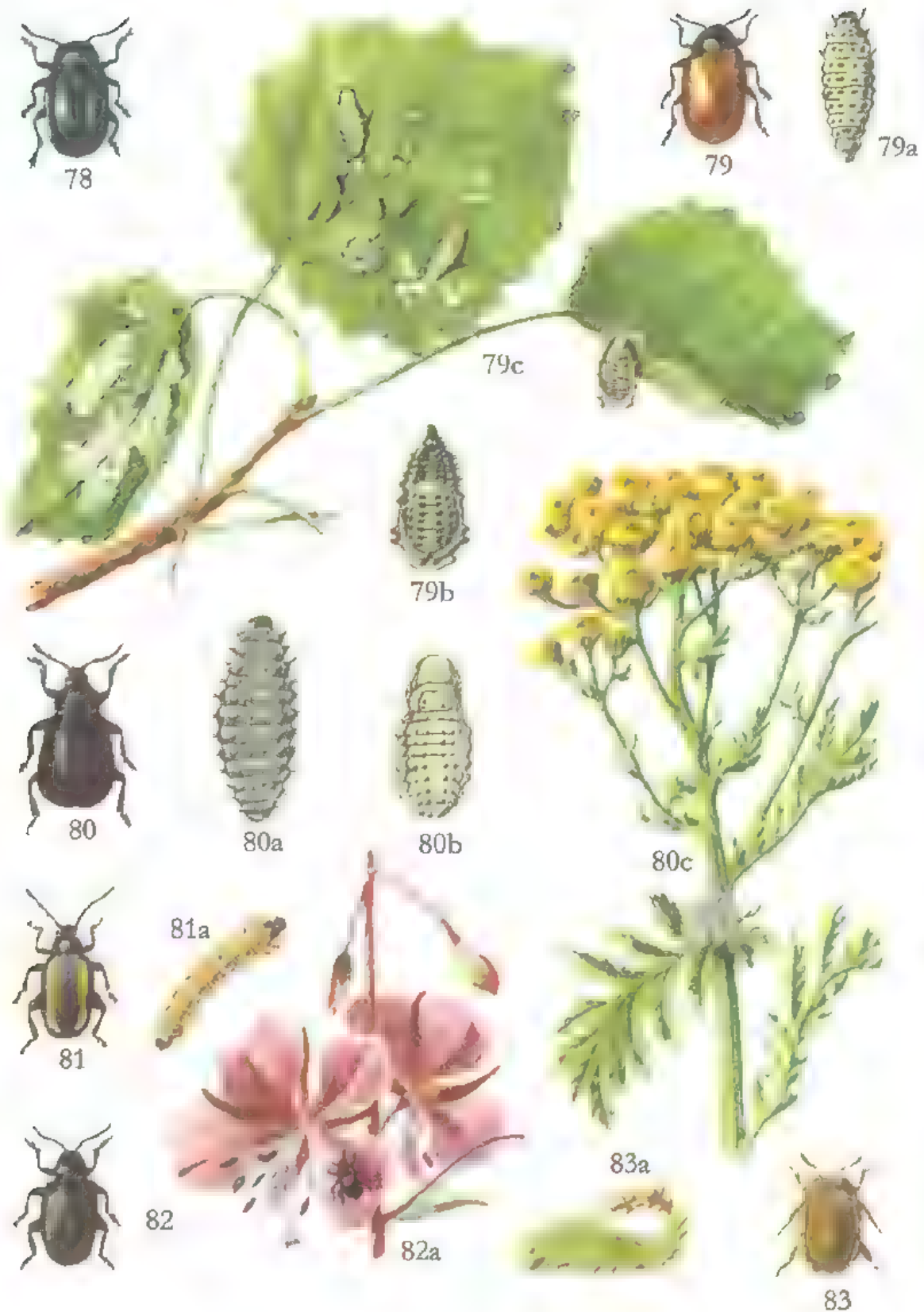




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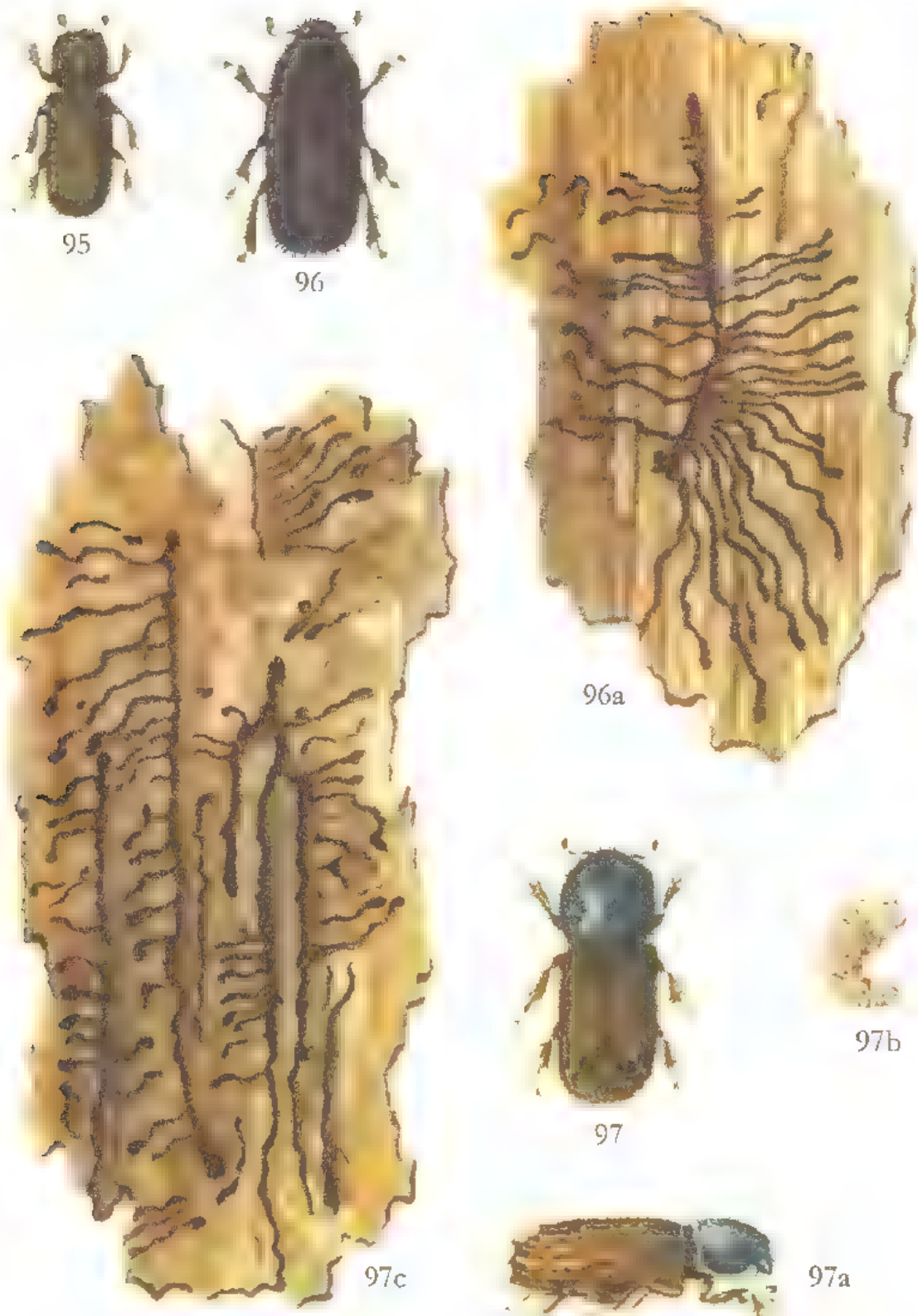


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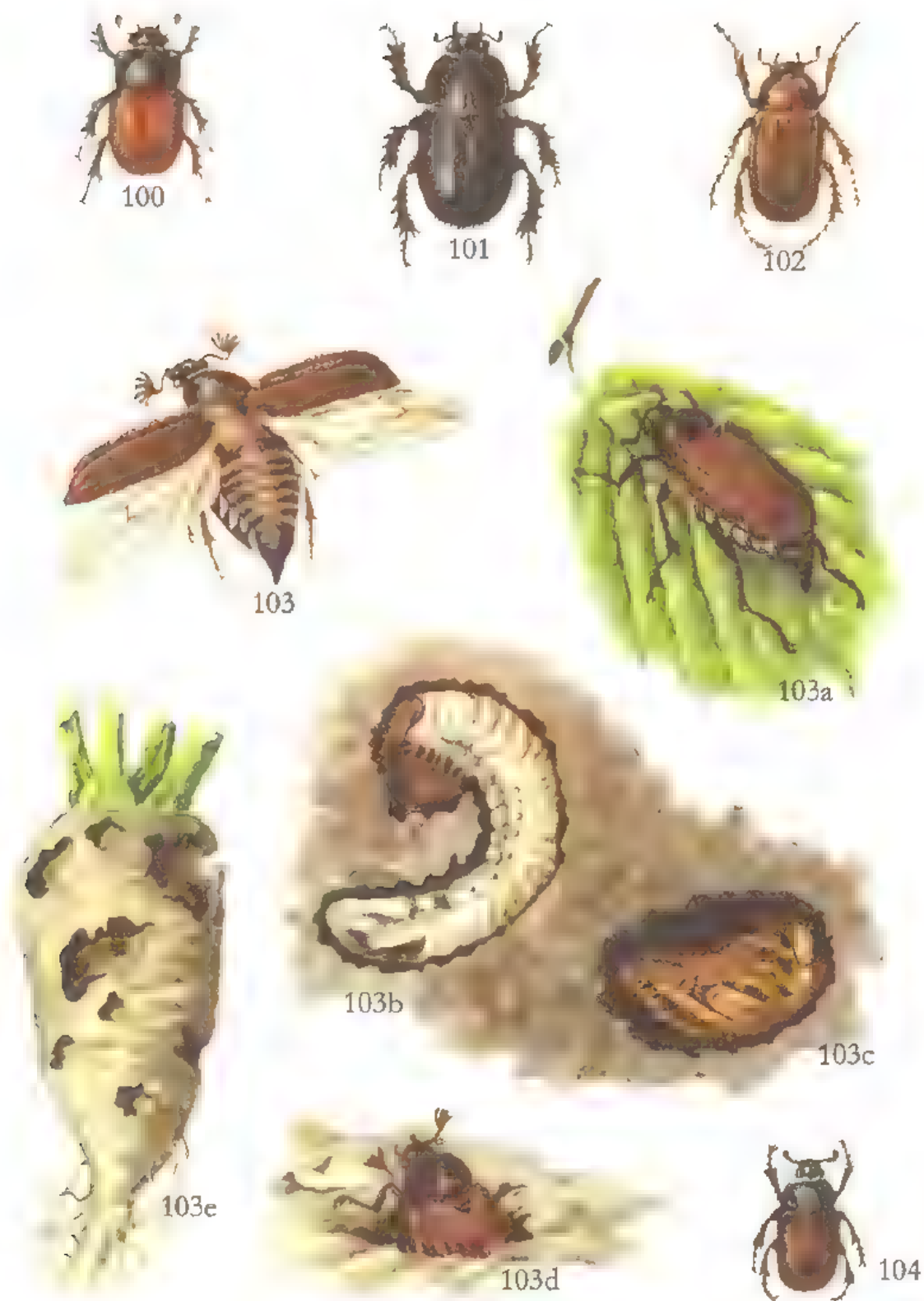
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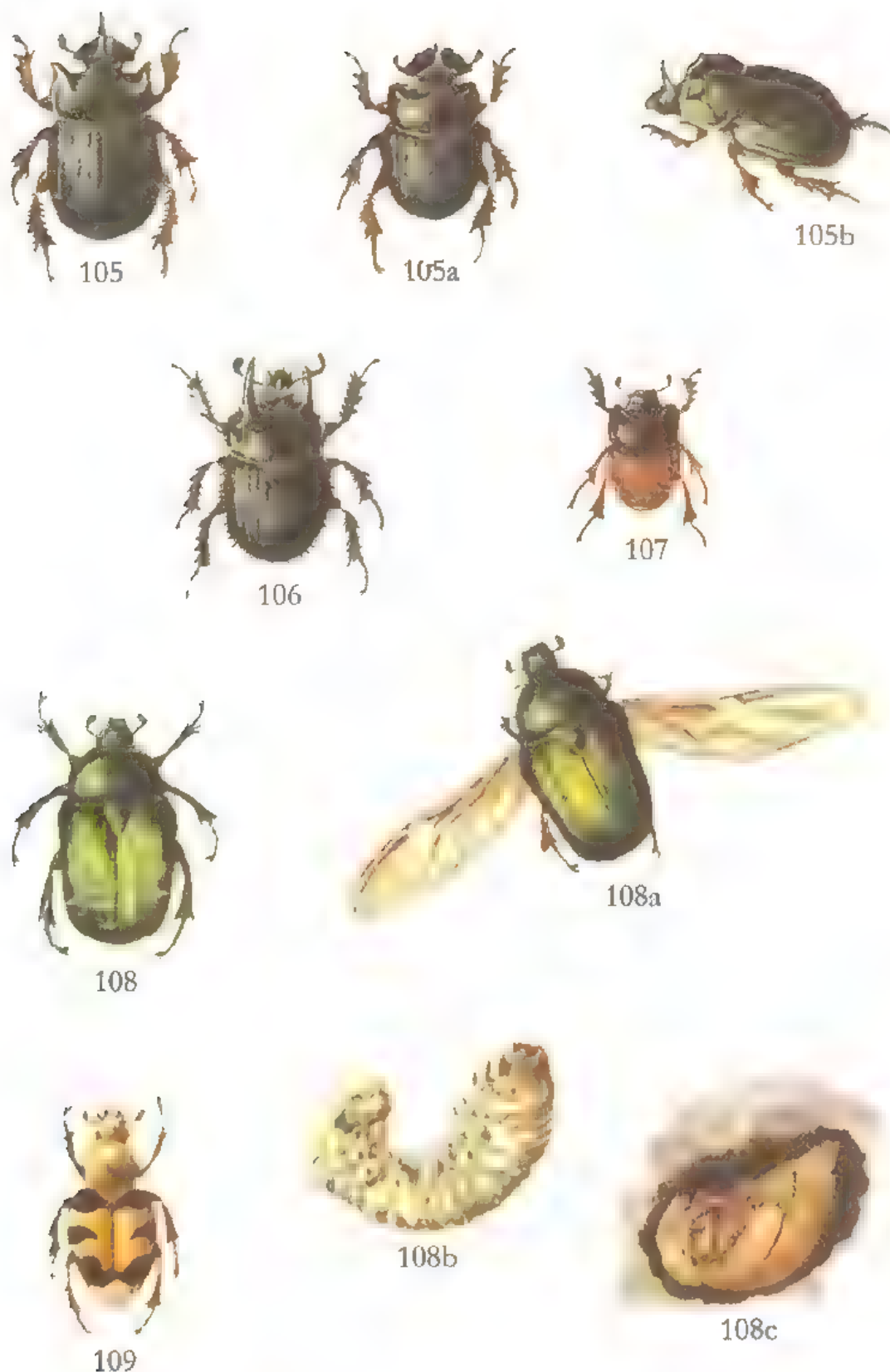


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112a



112b



112c



112d

112e



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113b



113a

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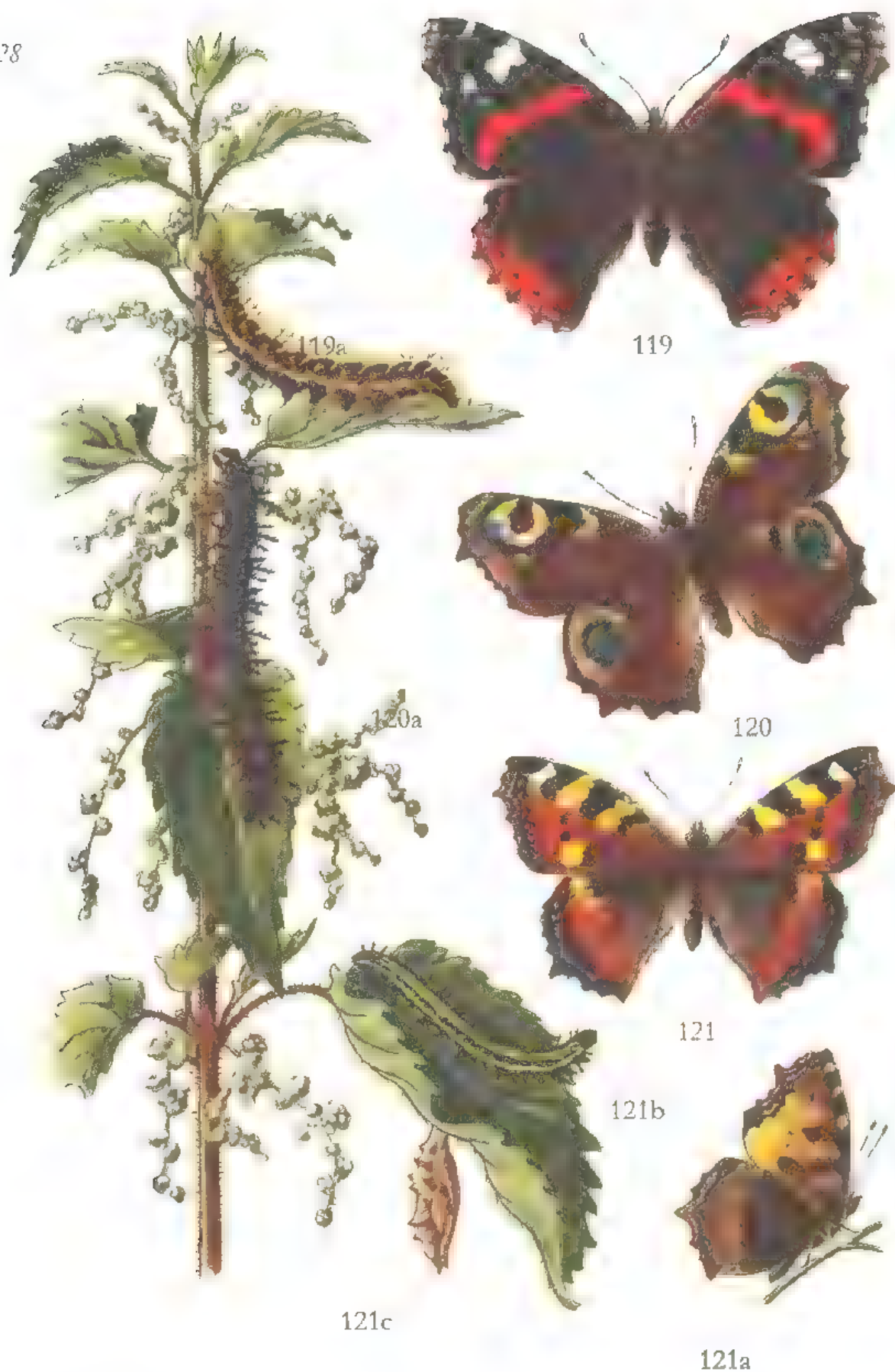


- 114 **Brimstone, *Gonepteryx rhamni***, male 114a female 114b caterpillar on buckthorn 114c chrysalis
- 115 **Black-veined White, *Aporia crataegi*** 115a young caterpillar in web on hawthorn 115b full-grown caterpillar





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- 119 Red Admiral, *Vanessa atalanta* 119a caterpillar  
 120 Peacock, *Nymphalis io* 120a caterpillar  
 121 Small Tortoiseshell, *Aglais urticae* 121a under-side 121b caterpillar 121c chrysalis

The caterpillars of all three species feed on stinging nettles



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127a



128a



128



129



129a



130a



130

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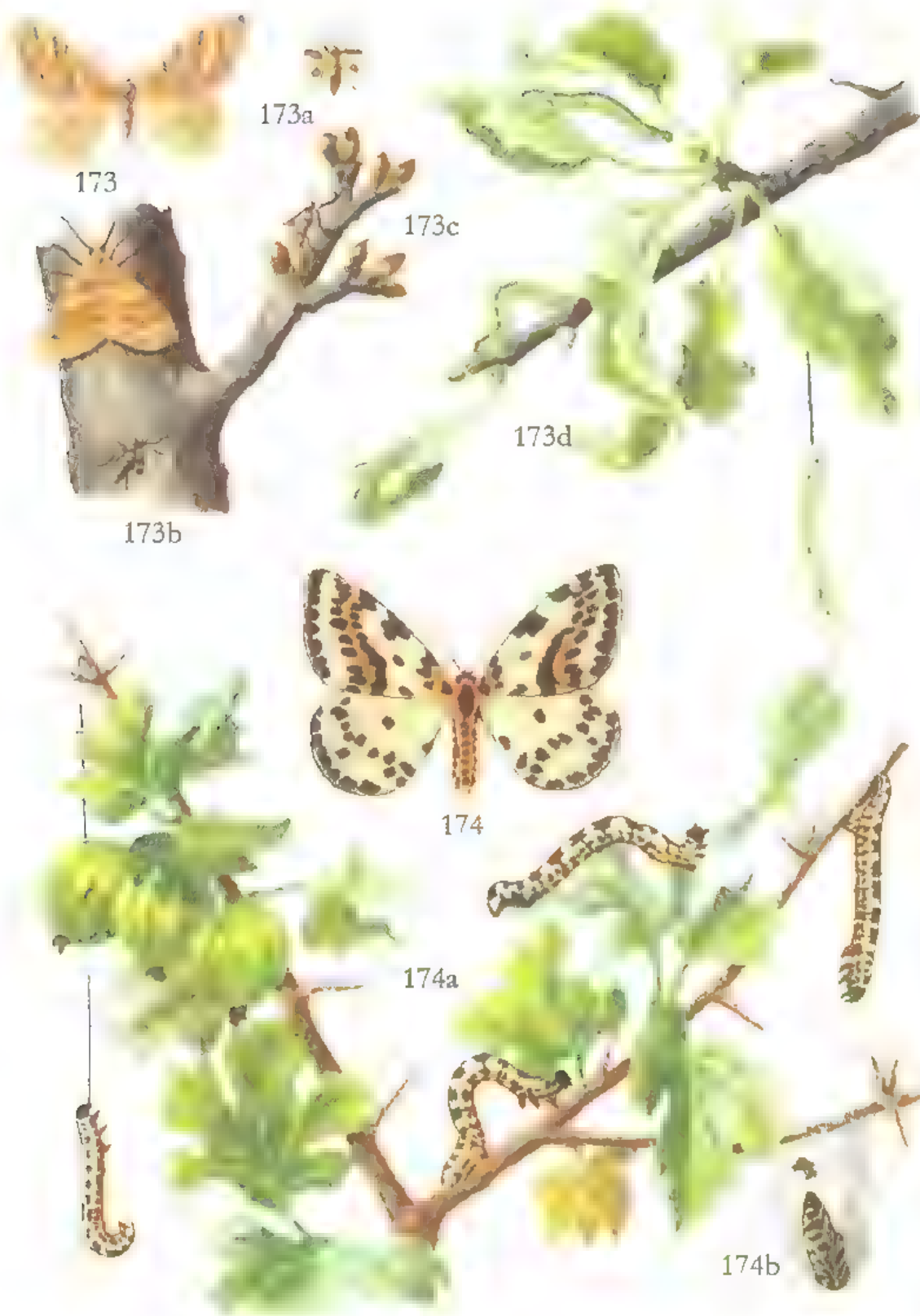


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178b



178a



179



179a

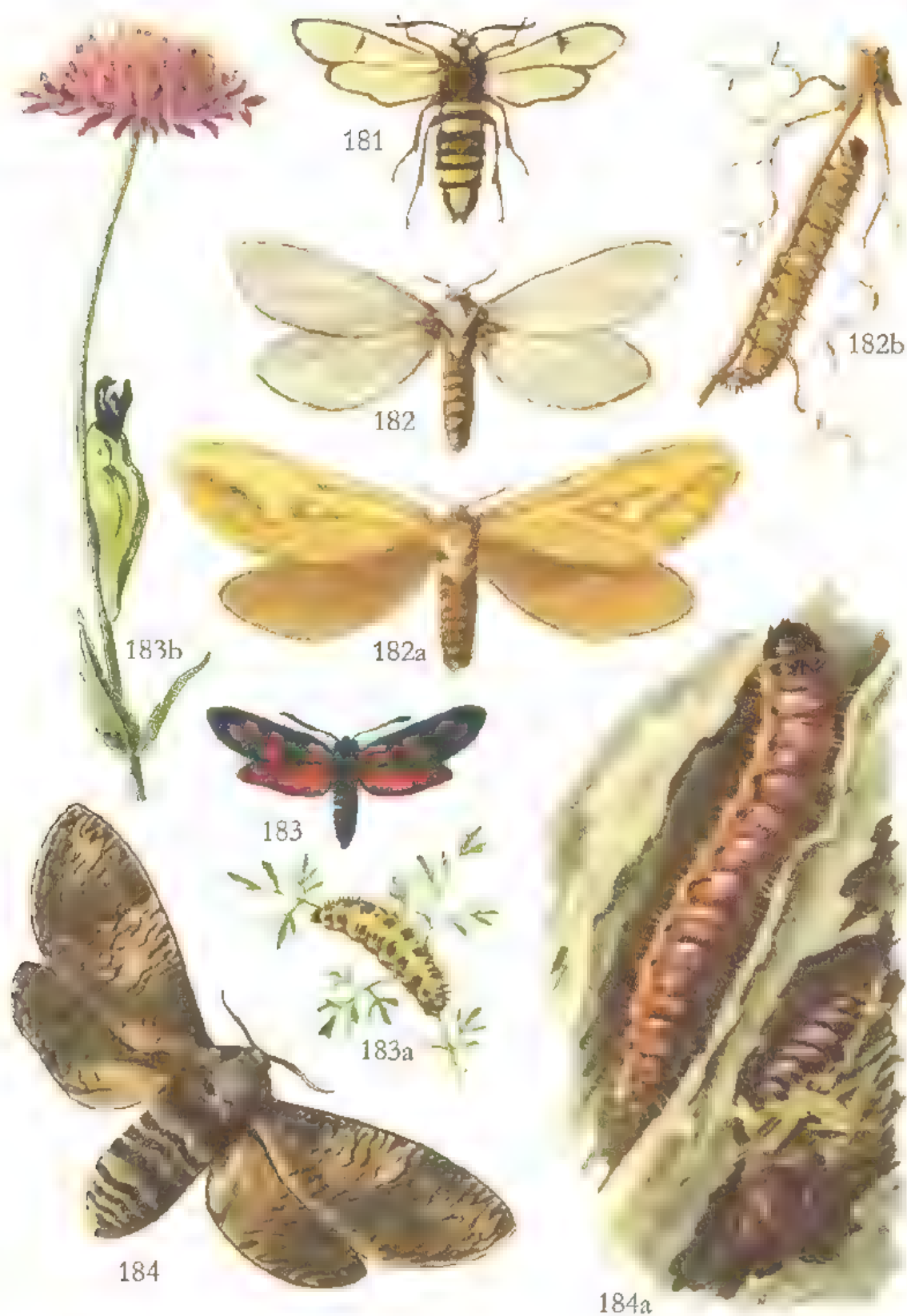


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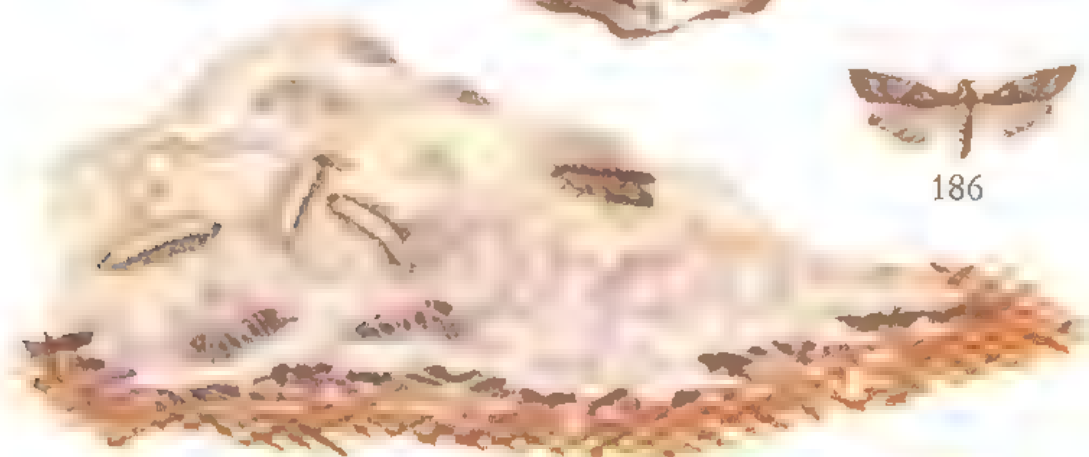


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185a



185b



186

186a



187

187a

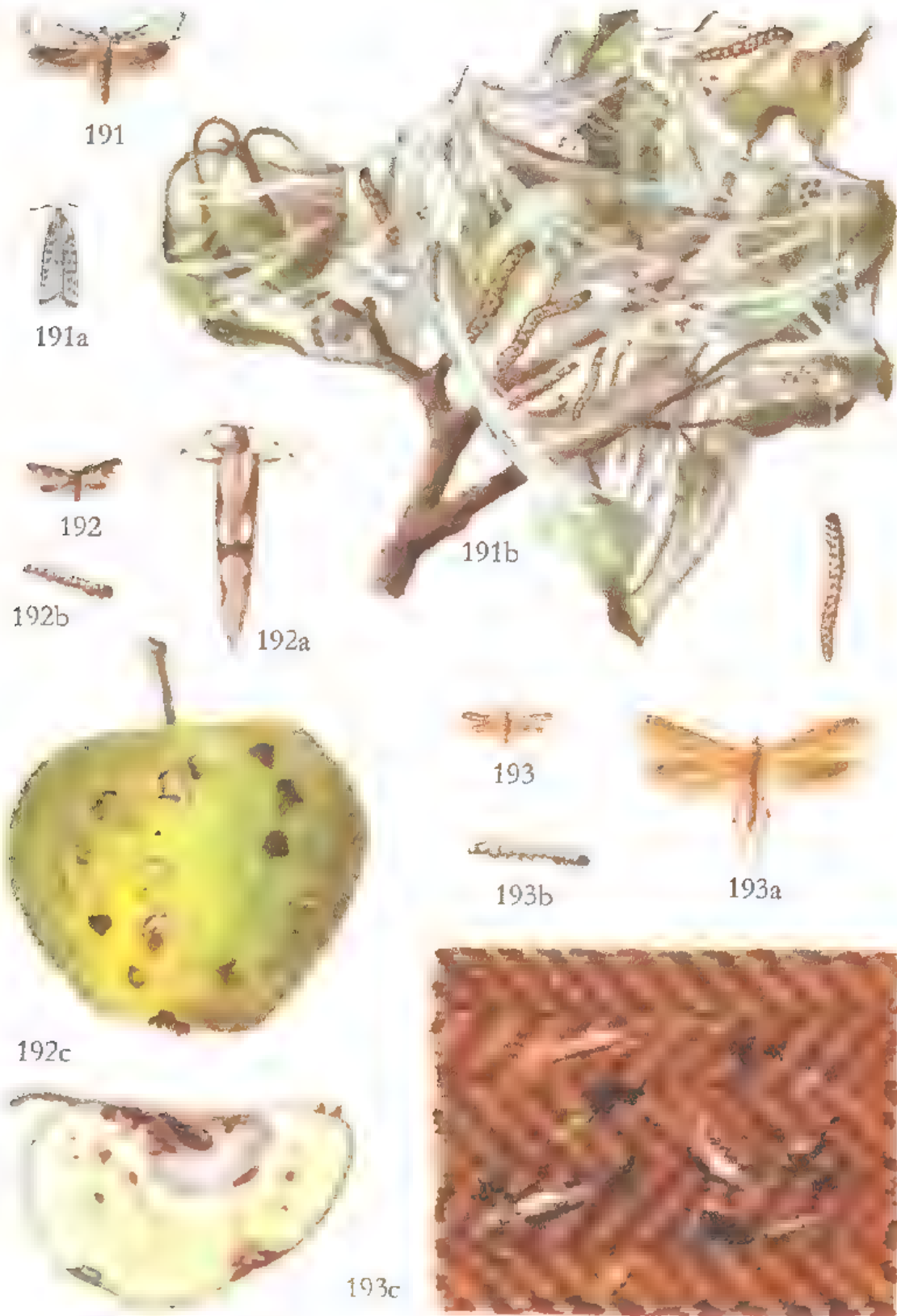
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187a

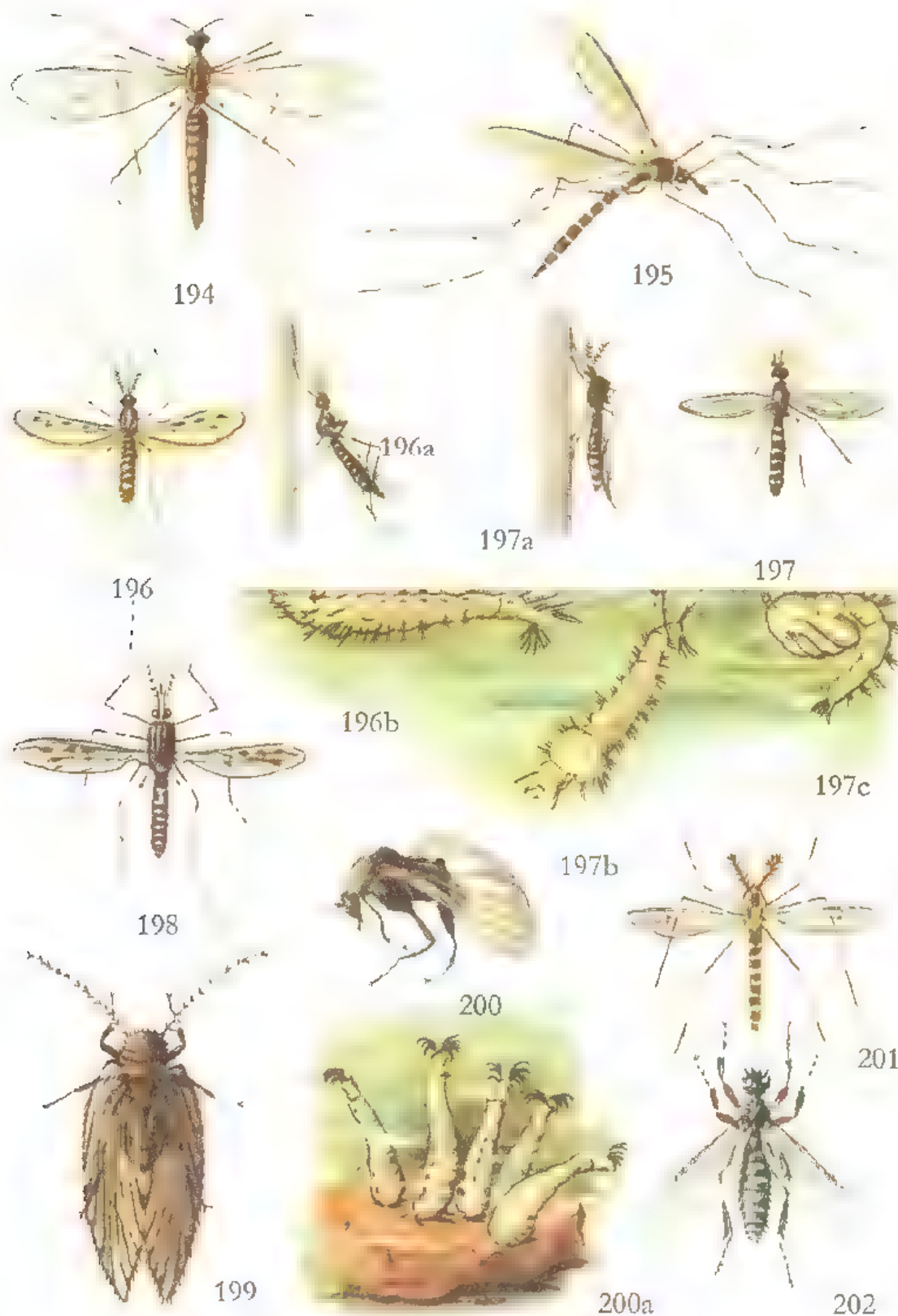
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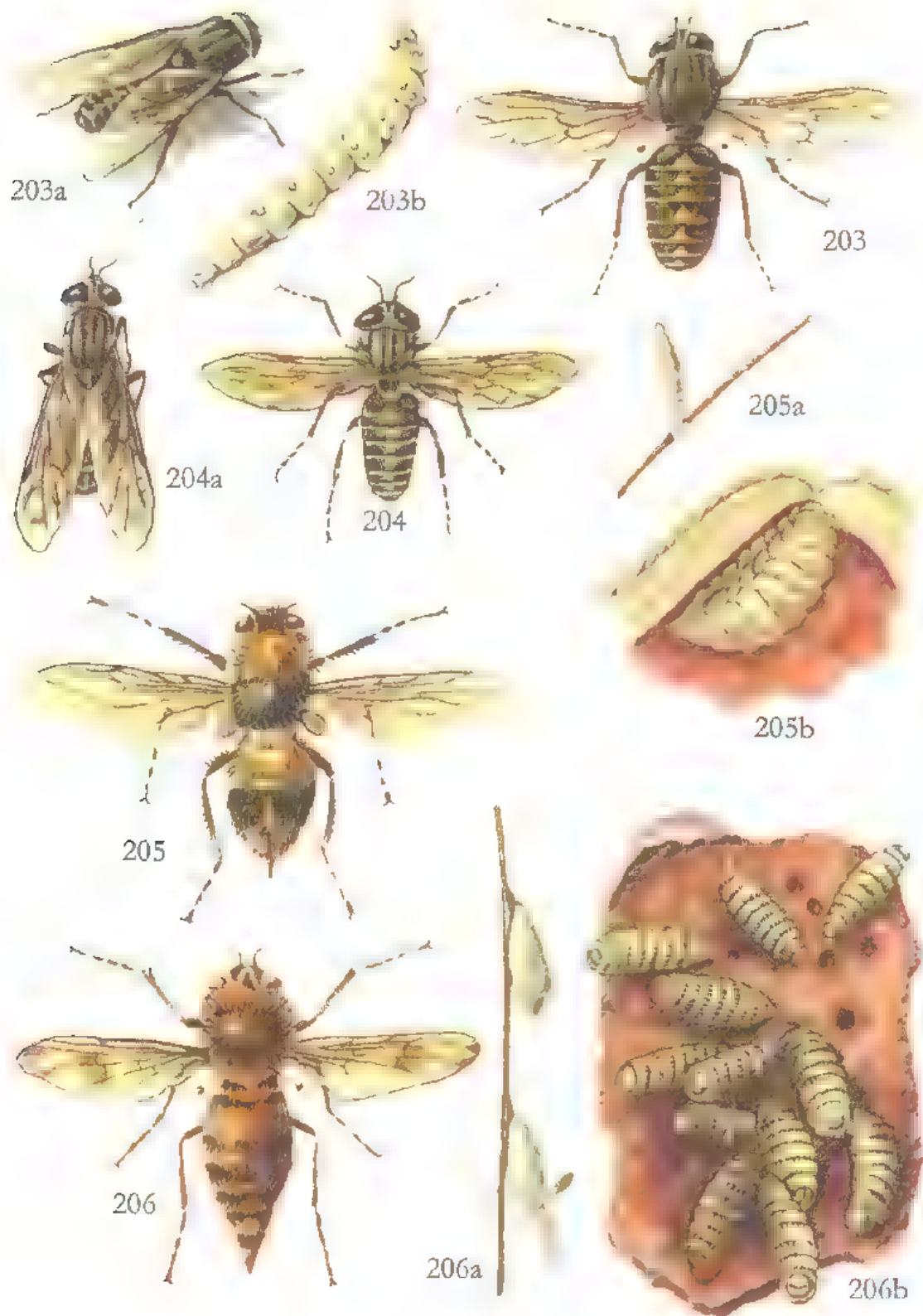


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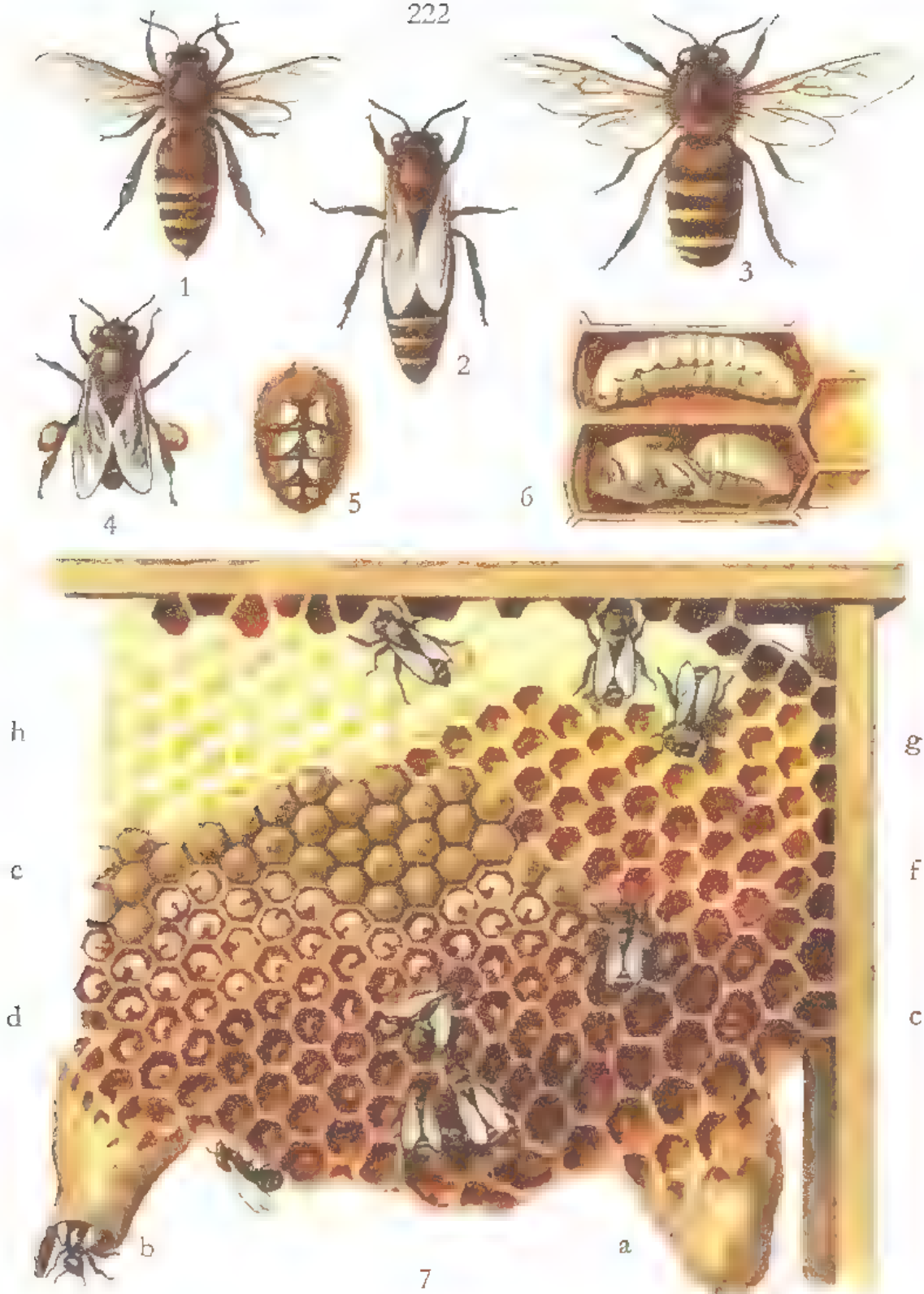
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 maggots in position



207 Assassin Fly, *Laphria marginata* 208 Large Bee Fly, *Bombylius major* 209 Swarming Hover Fly, *Scaeva pyrastris* 209a larva feeding on aphids 210 Drone Fly, *Eristalis tenax* 210a in resting attitude 210b larva 211 Vinegar Fly, *Drosophila transversa*, much enlarged 212 Flesh Fly, *Sarcophaga carnaria* 212a pupa 213 Green Bottle Fly, *Lucilia caesar*

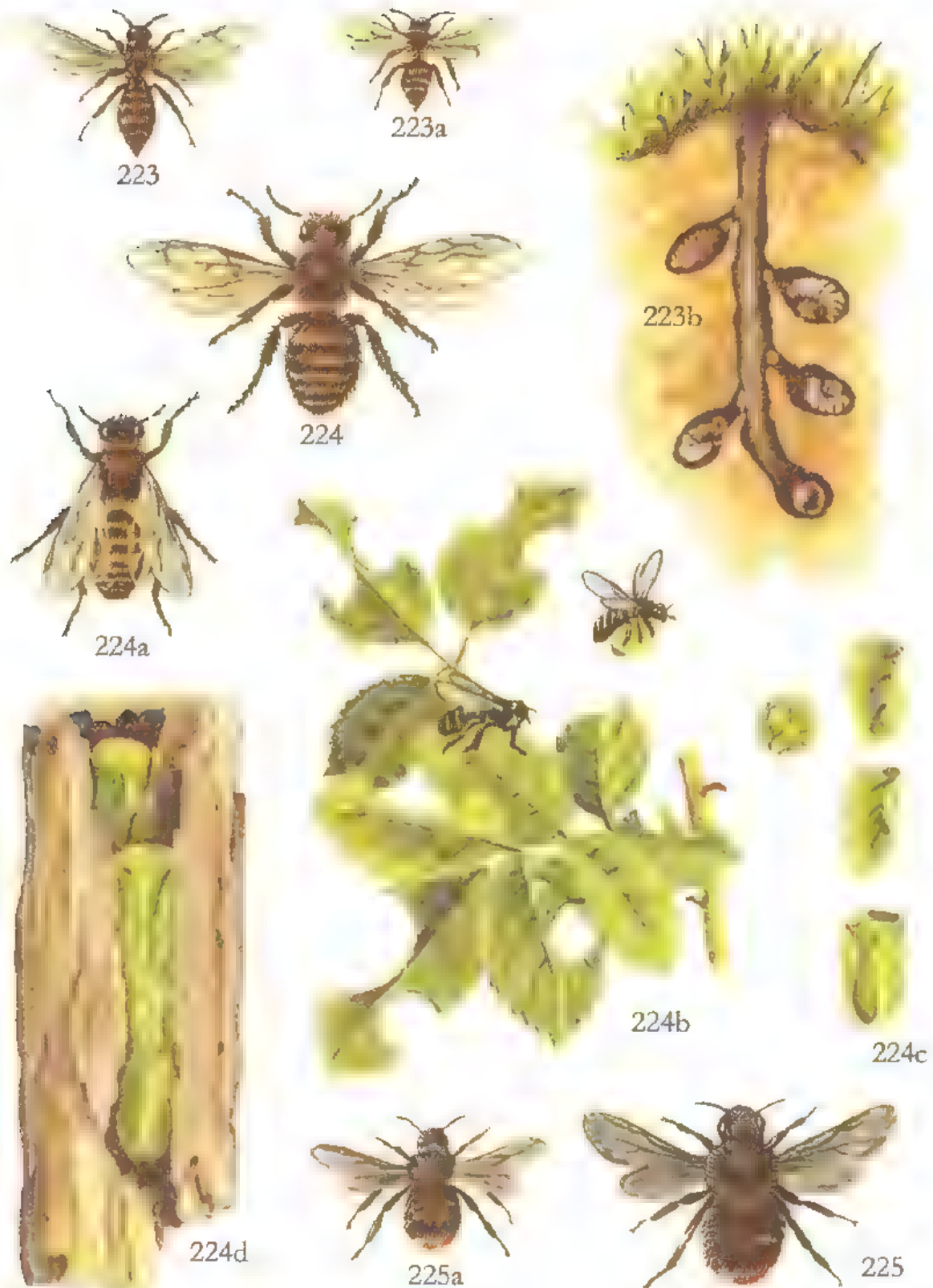


214 Blow Fly, *Calliphora vomitaria* 215 Deer Bot Fly, *Cephenomyia auribarbis* 215a larva 216 House Fly, *Musca domestica* 216a in cleaning attitude 216b maggot 216c puparium 217 Lesser House Fly, *Fannia canicularis* 218 Forest Fly, *Hippobosca equina* 218a in resting attitude 219 Sheep Ked, *Melophagus ovinus* 220 Dog Flea, *Ctenocephalides canis* 221 Flea, *Pulex irritans* 221a larva 221b pupa



222 Honey Bee or Hive Bee, *Apis mellifica* 1 Worker 2 Queen 3 Drone 4 Worker with laden pollen baskets 5 Abdomen of worker, showing wax scales on under side 6 Larva and pupa in cells 7 Comb with a) closed b) open queen cell with newly hatched queen emerging c) drone cells d) worker cells with eggs and larvae in various stages e) sealed brood cells f) pollen cells g) open and h) sealed honey cells

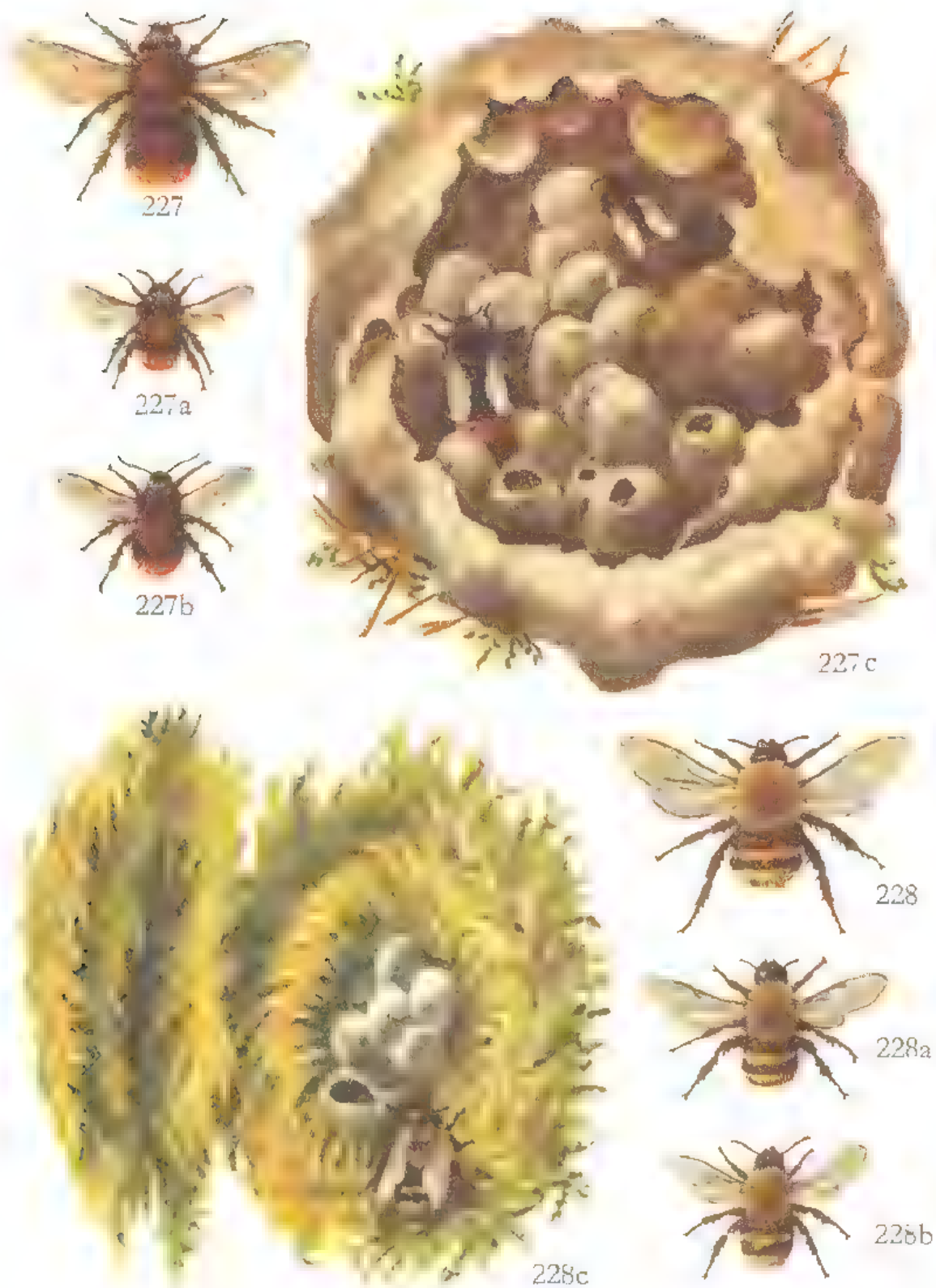




223 Early Mining Bee, *Andrena albicans*, male 223a female 223b shaft in soil with larval chambers 224 Patchwork Leaf-cutter Bee, *Megachile centuncularis*, female 224a male 224b rose leaves, showing cuts made by bees 224c portions of leaves cut to form cells 224d cells in position in hollow wood 225 Hill Cuckoo Bee, *Psithyrus rupestris*, female 225a male



226 Buff-tailed Bumble Bee, *Bombus terrestris* 1 Female 2 Worker  
3 Male 4 Underground nest



227 Red-tailed Bumble Bee, *Bombus lapidarius*, female 227a worker  
 227b male 227c nest partly opened to show interior 228 Common  
 Carder Bee, *Bombus agrorum*, female 228a worker 228b male 228c  
 nest made of grass and moss, opened to show queen and first brood cells



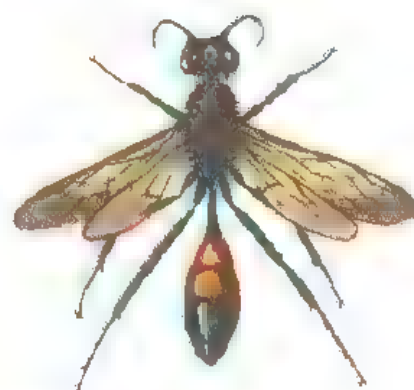
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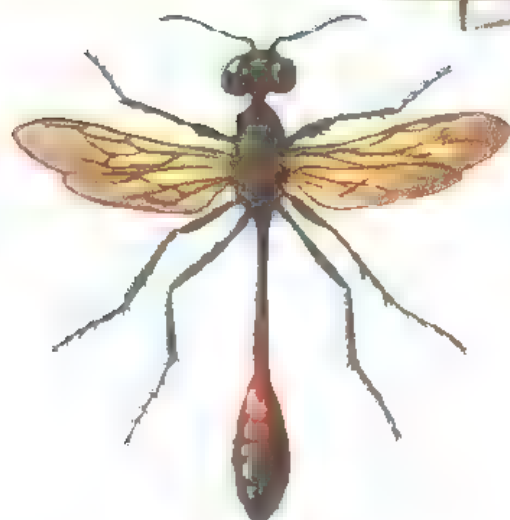
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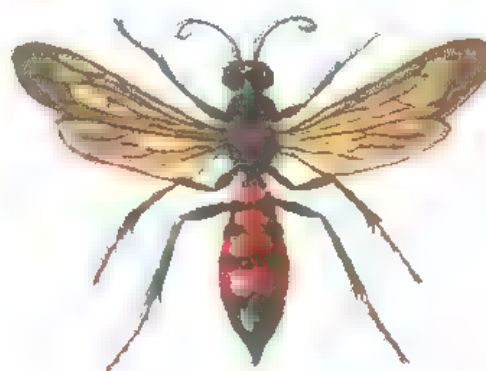
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231a



232



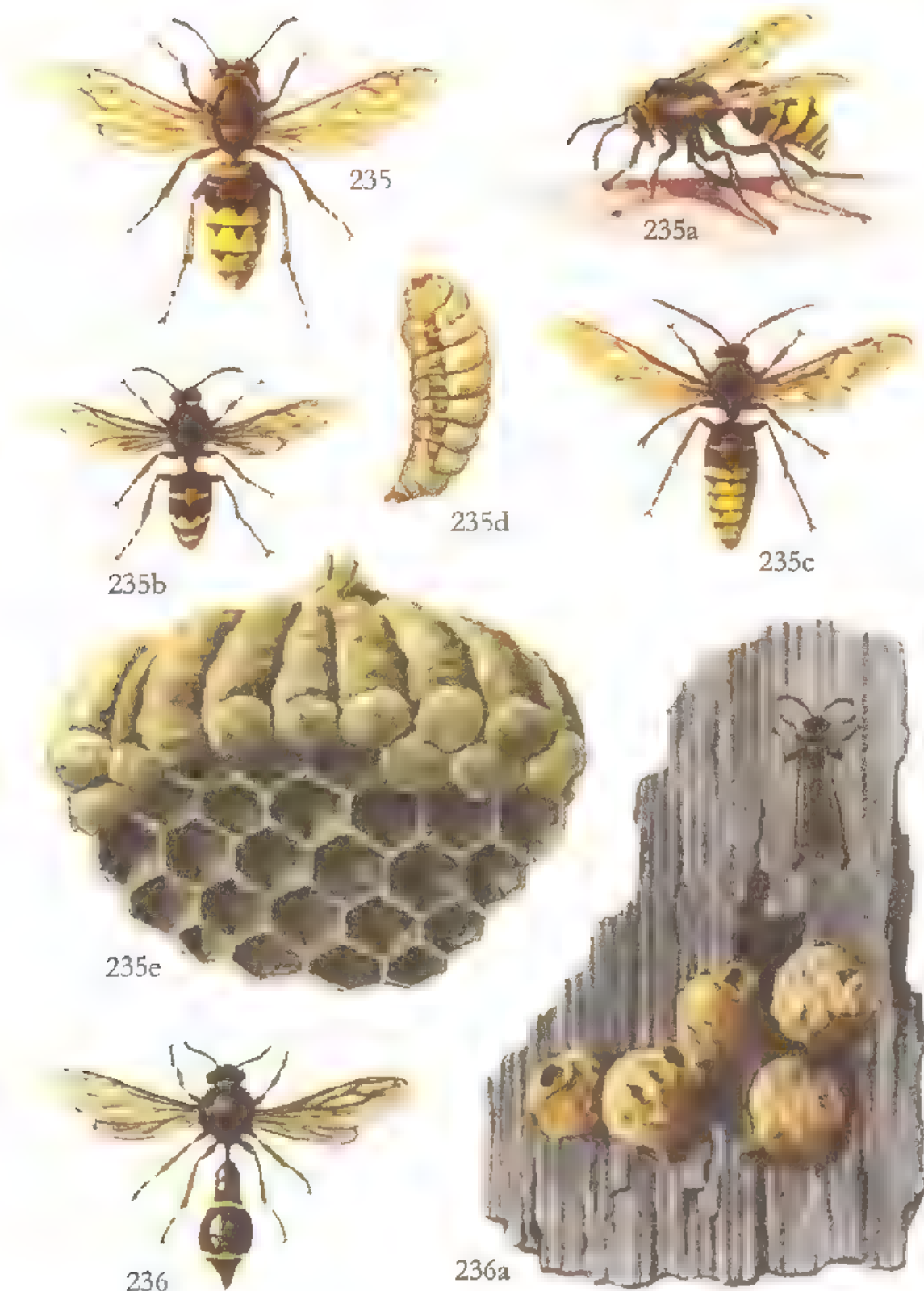
233

229 Big-headed Digger Wasp, *Ectemnius cavifrons* 230 Wall Mason Wasp, *Odynerus parietum* 230a nest 231 Hairy Sand Wasp, *Podalonia natica* 231a stinging caterpillar of night-flying moth 232 Red-banded Sand Wasp, *Sphex sabulosa* 233 Red-banded Spider Wasp, *Anoplius fuscus*





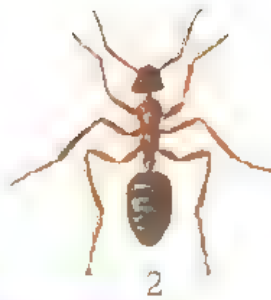
234 Common Wasp, *Vespa vulgaris* 1 Female 2 Worker 3 Male  
4 partly opened underground nest



235 Hornet, *Vespa crabro*, female 235a in profile 235b worker 235c male 235d larva 235e part of the nest with open and closed cells  
 236 Heath Potter Wasp, *Eumenes coarctata* 236a the wasp in resting attitude, with three open and two closed cells



1



2



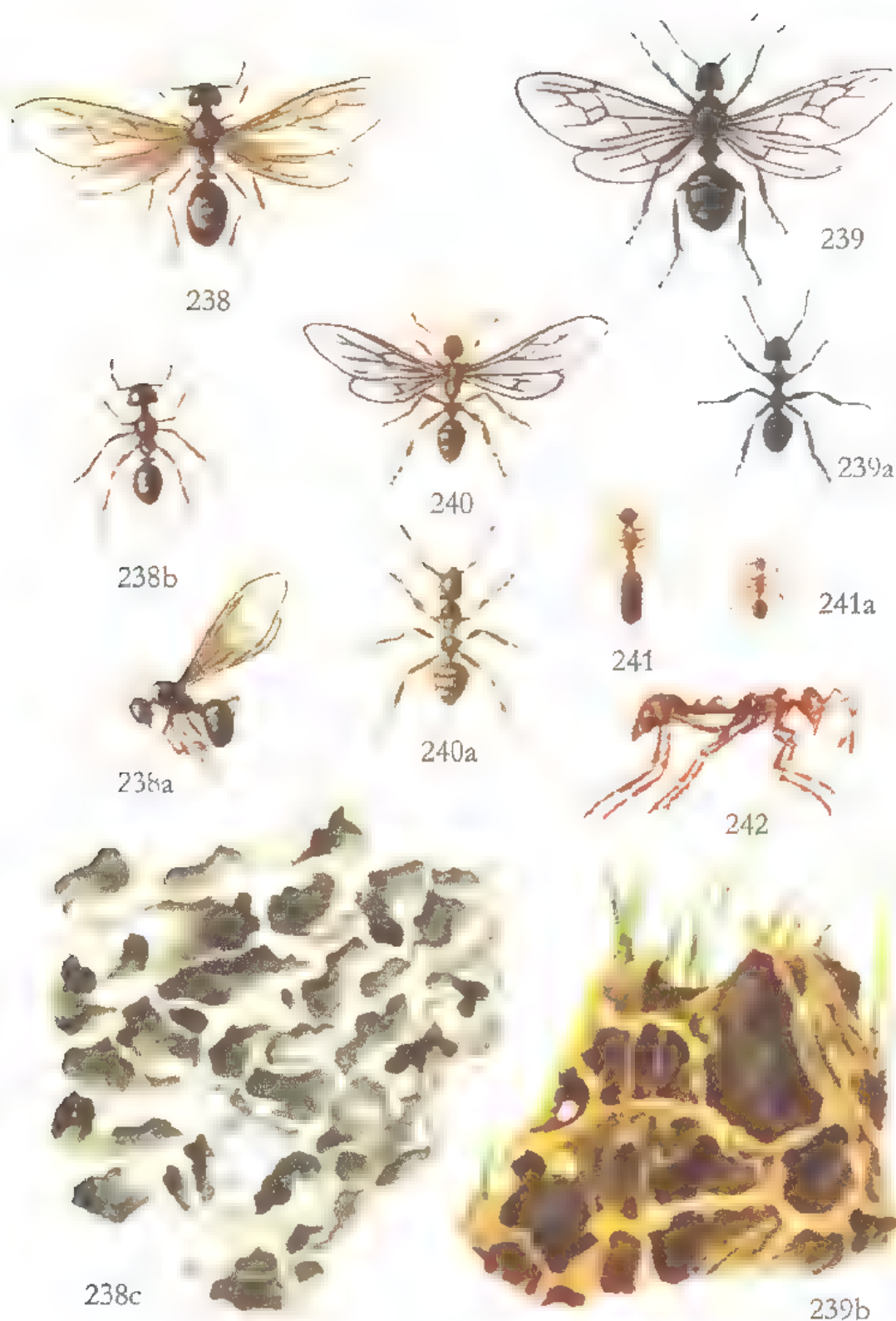
4



3



237 Wood Ant, *Formica rufa* 1 Winged female 2 and 3 Workers 4 Winged male 5 Section of underground portion of nest showing a) eggs, b) larvae, c) pupae, 6 anthill above the nest



238 **Jet Ant**, *Lasius fuliginosus*, female 238a female profile 238b worker  
 238c part of nest 239 **Small Black Ant**, *Lasius niger*, female 239a  
 worker 239b part of nest, built among grass 240 **Yellow Ant**, *Lasius*  
*flavus*, male 240a female 241 **Pharaoh's Ant** *Monomorium pharaonis*,  
 female, 241a worker 242 **Red Ant**, *Myrmica rubra*, worker

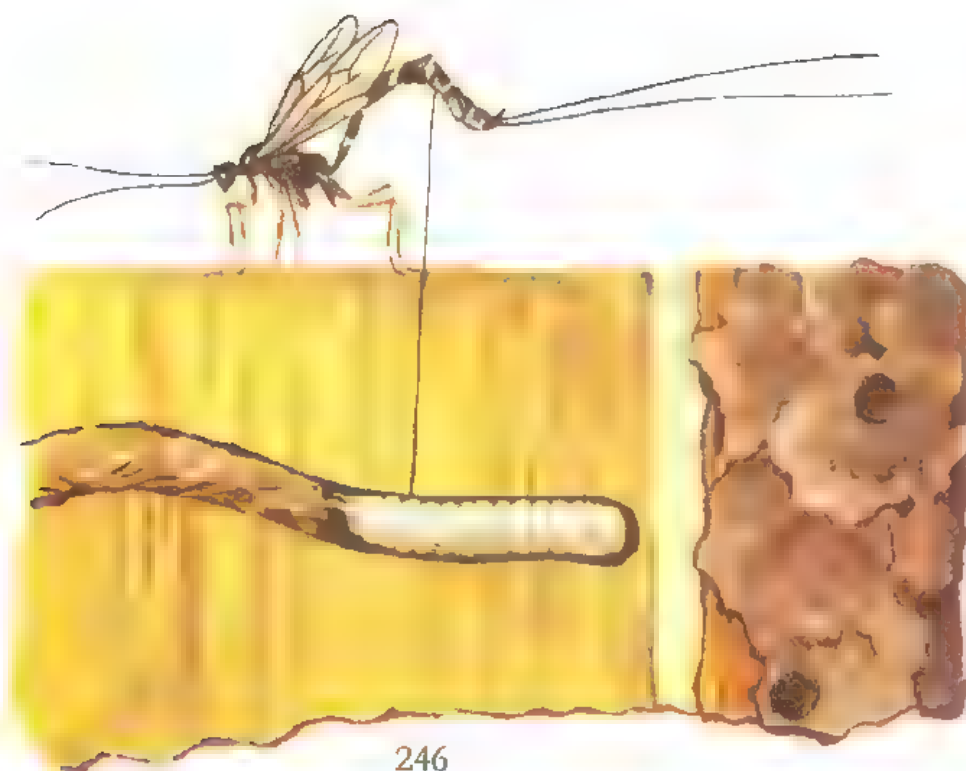




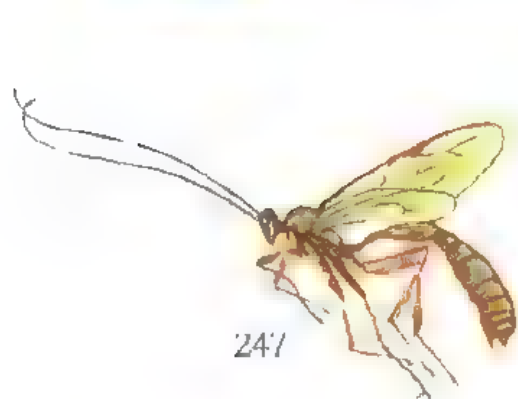
243 Ruby-tailed Wasp, *Chrysis ignita*

244 Cherry Gall, *Cynips quercusfolii* 244a cherry galls on oak leaf  
244b cut gall to show larva

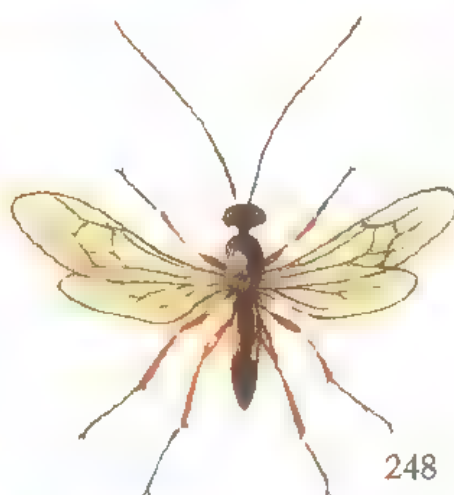
245 Robin's Pin Cushion, *Rhodites rosae* 245a the gall on rose stem  
245b gall cut open to show larvae in chambers



246



247

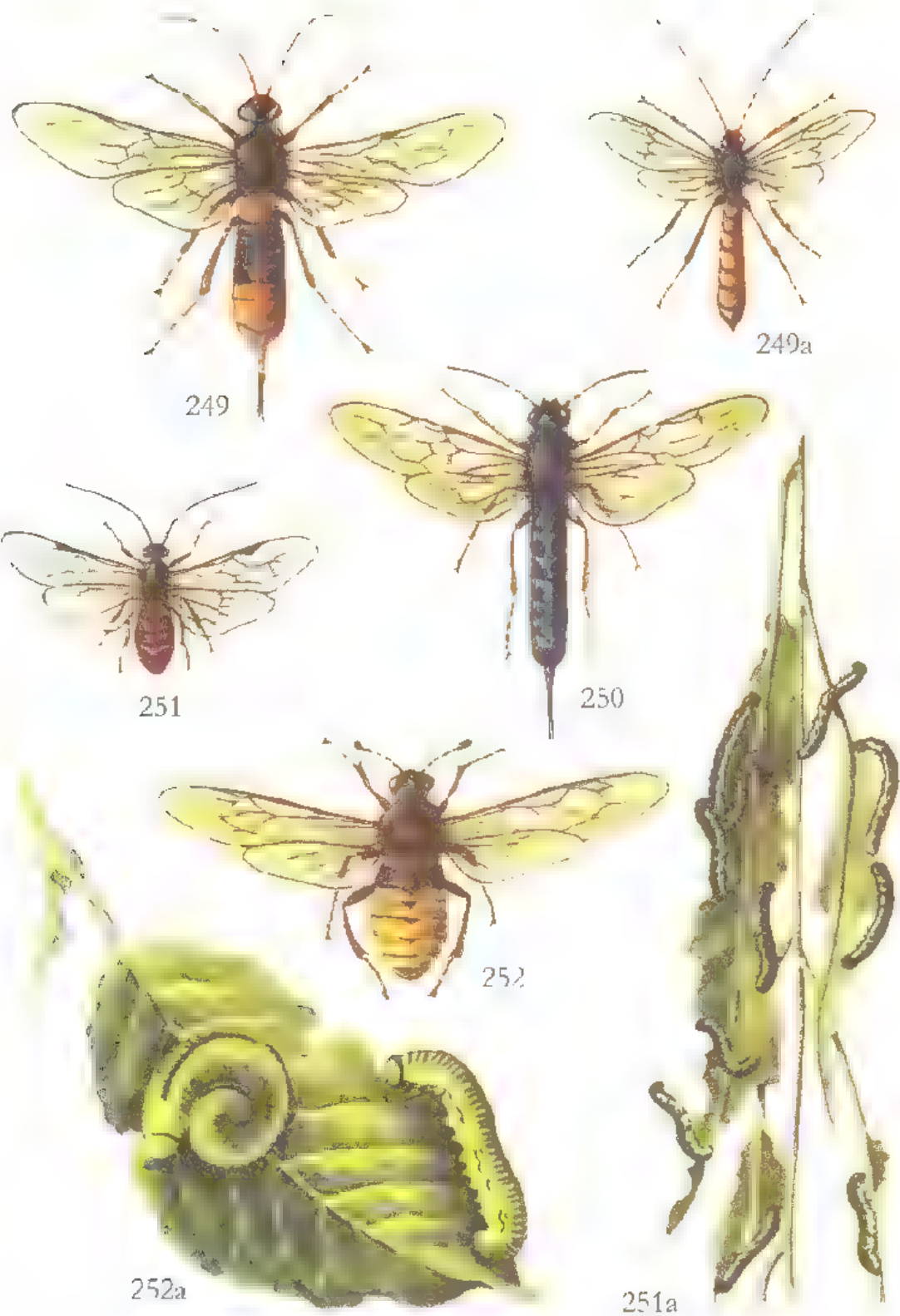


248



248a

- 246 Horn-tail Ichneumon, *Rhyssa persuasoria*, female laying egg on larva of Giant Wood Wasp
- 247 Yellow Ophion, *Ophion luteus*
- 248 Cabbage White Wasp, *Apanteles glomeratus* 248a grubs emerging from Cabbage White caterpillar, and their cocoons



- 249 Giant Wood Wasp, *Sirex gigas*, female    249a male  
 250 Steel-blue Wood Wasp, *Sirex juvencus*  
 251 Willow Sawfly, *Pteronidea salicis*    251a larvae on willow leaves  
 252 Yellow Cimbex, *Cimbex lutea*    252a larvae on willow



253

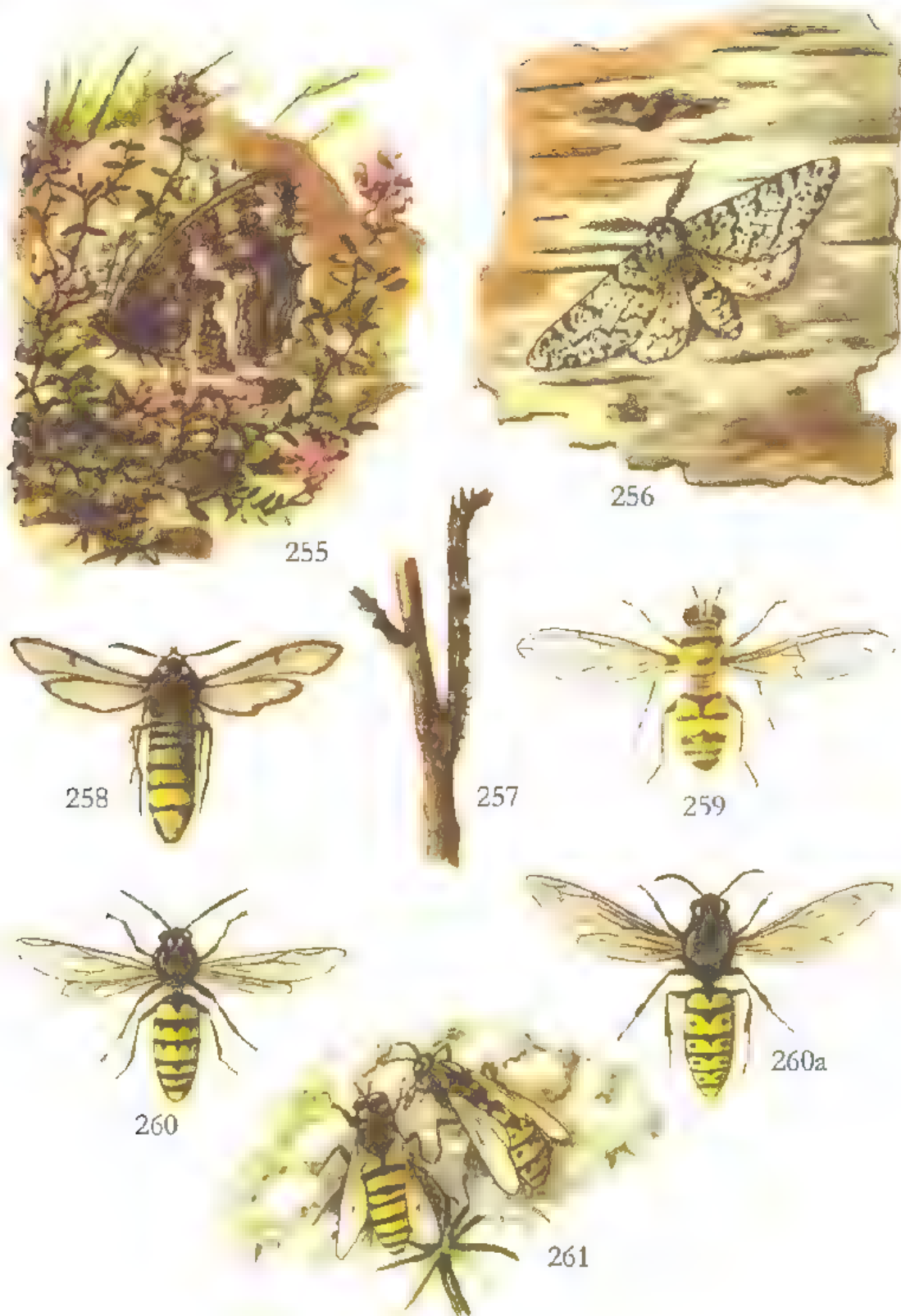


254

## PROTECTIVE RESEMBLANCE

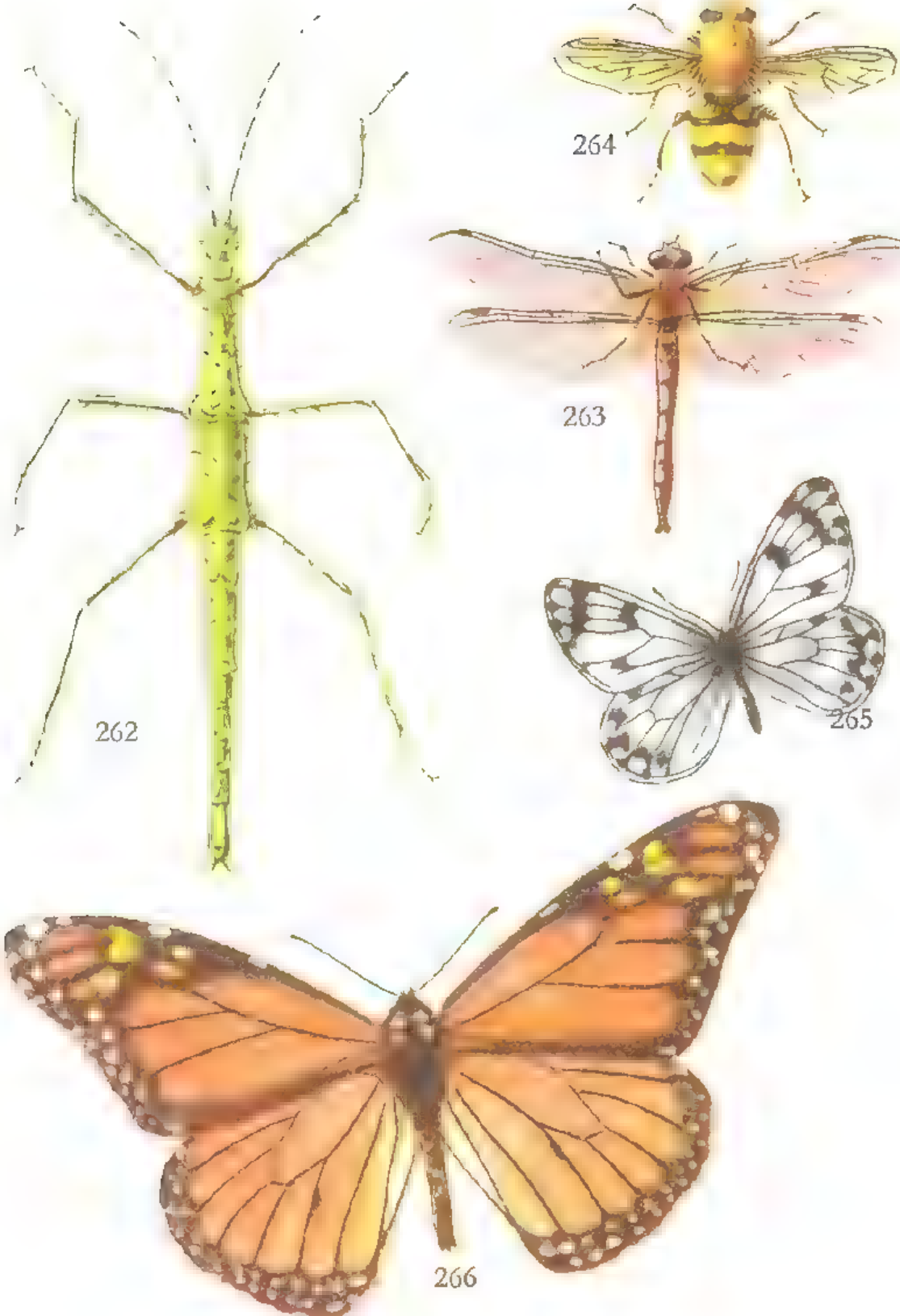
- 253 Timberman, *Acanthocinus aedilis* on bark  
 254 Narrow Water Scorpion, *Ranatra linearis*, among pond weeds





## PROTECTIVE RESEMBLANCE

255 Grayling, *Satyrus semele* on ground amongst thyme 256 Peppered Moth, *Biston betularia* on birch bark 257 Stick caterpillar of Phoenix Moth, *Lygris prunata* on currant stem 258 Hornet Clearwing Moth, *Sesia apiformis* and 259 Swarming Hover Fly, *Myiatropa florea* mimicking 260 The Common Wasp, *Vespa vulgaris*, male 260a female 261 Wasp (on right) and Hover Fly (on left) on flowerhead



#### RARE VISITORS

262 New Zealand Stick Insect, *Acanthoxyla prasina* 263 Red-veined Dragonfly, *Sympetrum fonscolombii* 264 Banded Hover Fly, *Volucella zonaria* 265 Bath White, *Pontia daplidice* 266 Milkweed Butterfly, *Danaus plexippus*



267 Colorado Beetle, *Leptinotarsa decemlineata* 1 beetle 2 larva 3 pupa 4 egg mass (all enlarged) 5 beetle and pupa on potato haulms (natural size)

## INTRODUCTION

In the popular mind, almost any small creeping, crawling or flying creature is an insect. To naturalists, however, the term is a precise one having a definite application. The celebrated Swedish scientist, Carl von Linné, who in 1758 published his *Systema Naturae*, and thus provided naturalists with the method of naming and describing animals that is still in use, applied the term *Insecta* to the crabs, shrimps and lobsters, spiders and mites, centipedes and millipedes as well as the true insects, because all these have bodies made up of rings or segments.

True insects, when adult, can be distinguished from these others because they have the following combination of characters:- (1) a separate head bearing one pair of antennae (feelers), eyes, and three pairs of mouth parts, (2) a thorax composed of three segments more or less fused together each bearing one pair of legs and, in the case of the second and third segments, also as a rule a pair of wings, (3) a body composed of about ten visible segments and devoid of legs. These features can be seen in the outline figures of a ground beetle given on page 73 provided it is remembered that the beetle's elytra (5 in the right hand figure) correspond with the forewings of a moth or butterfly, and that the hind wings are hidden beneath them. The three sets of mouth parts are indicated by the letters A, B and B' in the left hand figure, A being the jaws and B and B' the two sets of palpi used as organs of touch. In a class of animals so numerous both in individuals and in species as the insects, an almost endless range of variation in the shape and function of these principal structures has developed during their immense period of evolution. Some insects have lost the front pair of wings, many the hind wings, and even more have none at all. In many butterflies, such as the tortoiseshells, the front legs are reduced to small brush-like organs; some parasitic insects, even when adult, are devoid of legs. The comparatively simple mouth parts of such an insect as the ground beetle illustrated, or a cockroach, have been modified to form the piercing and sucking organs of bugs and mosquitoes and the long coiled proboscis of a butterfly or moth. Several different types of antennae are illustrated on page 73.

Insects differ from nearly all other animals in that their hard parts are on the outside. They have no internal skeleton, only an external one, called an exoskeleton. This is composed mainly of a horny material called chitin, very tough and durable. To the inner surfaces of this are attached all the muscles that are used in movement, in feeding, egg-laying etc. Along the sides of this 'case' as it might be called there is to be seen a series of very small openings, called spiracles, one on either side of most segments, through which the insect breathes. It has no lungs, the air being distributed throughout the body by means of minute branching tubes. Along the lower surface of the body there runs a double nerve cord, similarly branching in each segment, and broadening and thickening in the head and uniting above the mouth to form a brain. The alimentary canal (gut) through which food passes during digestion, in its simplest form, is little more than a tube running from the mouth to the tip of the abdomen. All the internal parts are bathed in a blood-fluid which is usually colourless and is circulated by means of a heart which takes the form of a tube lying along the insect's back; its pulsations can easily be seen through the semi-transparent skin of many caterpillars.



Like most animals, insects begin life as eggs. These are, in the great majority of cases, laid by the females on or near the food that the young larvae (grubs, maggots, caterpillars etc.) will need on hatching. However, in insects there are many exceptions; reference is made in the descriptions of the figures, for example, to the fact that in many flies and aphids, the eggs develop within the body of the female into larvae which are born alive. Fertilisation of the eggs is normally secured only by the union of the sexes; here again some female insects depart from the normal and reproduce their kind without any intervention of the male, a phenomenon known as parthenogenesis or virgin birth, and very common among aphids and sawflies.

The grub that hatches from the egg may look very much like the full-grown insect that laid the egg (a young grasshopper for example) or it may, if it is a fly maggot or a caterpillar, look utterly different. In the most primitive kinds of insect, such as *Lepisma* (Fig. 1), which never have wings, the young are indistinguishable from the adults, except in size, and there are no visible external changes during growth; such insects are said to be ametabolous. Another type of development is well illustrated by the grasshoppers (Fig. 7) and bugs (Figs. 16/20). In these at each moult the young larva comes increasingly to resemble the adult, especially in the external growth of the wings. Such larvae are generally called nymphs and the type of development they show is said to be hemimetabolous, which implies that there are visible changes of form during growth but not such complete differences between the stages as in the next group. This third and last group contains the bulk of the insect world, since it includes the beetles, butterflies and moths, flies, ants, bees and wasps. In these development is complete (holometabolous) since the four stages through which the insect passes, egg → caterpillar (or maggot) → chrysalis (or pupa) → adult are utterly different and distinct. Whatever course of development an insect pursues from egg to adult, the sole functions of the larva are eating and growing. Once the adult stage has been reached, no further growth occurs; small flies do not, for example, grow into larger flies, nor small moths, like clothes moths, into bigger moths. The difficulty of growth whilst enclosed in a tough, horny exoskeleton of chitin, which does not expand, is overcome by the process of moulting. For example, when the skin of a caterpillar has become too tight for it, it moults, like a snake. At the moment of moulting the underlying chitin is soft and readily expands to the new size required; but it quickly hardens on exposure to the air. The number of moults that occur during growth varies enormously. Most caterpillars moult five or six times; some beetle grubs, especially when in a not very favourable situation for feeding, may moult twenty or more times. Insects with the incomplete type of metamorphosis (change of form during growth) are generally active throughout life, the last larval moult leading directly to the adult. A very important feature of those with complete metamorphosis is the addition of the pupal stage. This is interposed between the last larval stage and the adult and is a resting stage during which the internal tissues are broken down and re-formed in the shape of the butterfly, bee, beetle or fly which will eventually emerge from the pupa or chrysalis.

To fit them for life in their special environments insects have the senses of sight, smell, taste, touch and hearing. Possibly they have other senses, for they are richly endowed with sense organs, most of which are exceedingly minute. Both larvae and adults have, as a general rule, simple eyes of a kind that can do little more than appreciate light intensities. The compound eyes, which are so conspicuous a

feature of moths, dragonflies and many other insects, consist of numbers (sometimes running to thousands) of separate optical units, each one represented by one of the facets on the surface of the eye. The mosaic that results from the combination of this large number of sectional pictures appears to be adequate. One has only to watch a dragonfly in flight to be convinced. That at least some butterflies and bees can distinguish some colours has been proved; and it is known also that in many insects vision extends much further into the ultra-violet range of the spectrum than in man, a fact made use of by collectors who use ultra-violet light as a means of attracting night-flying insects.

There is no doubt, however, that the senses of smell, taste and touch are those most important in an insect's life, provided it escapes its enemies by seeing or hearing them in time. The organs of touch are principally minute sensory hairs scattered widely over the surface of the body and limbs. The organs that perceive scents (sensillae) are so small that 30,000 of them may be present on a single antenna of a bee; they occur chiefly on the antennae and are highly sensitive, though probably limited in scope. It is certain that most moths and probably most other insects, find their mates by the sense of smell and the same sense is very important in the search for food. The well-known collector's trick of 'assembling' males of Eggar moths (and others) depends upon the ability of the male to detect the scent of the female at a range said often to exceed a mile. In hive bees too, and amongst ants, it is of the utmost importance; indeed the whole life of the colony in the case of ants depends on it. The organs of taste are even more widely distributed than those of smell; though mainly found in the region of the mouth, on palpi and proboscis for example, they are also often present on the feet.

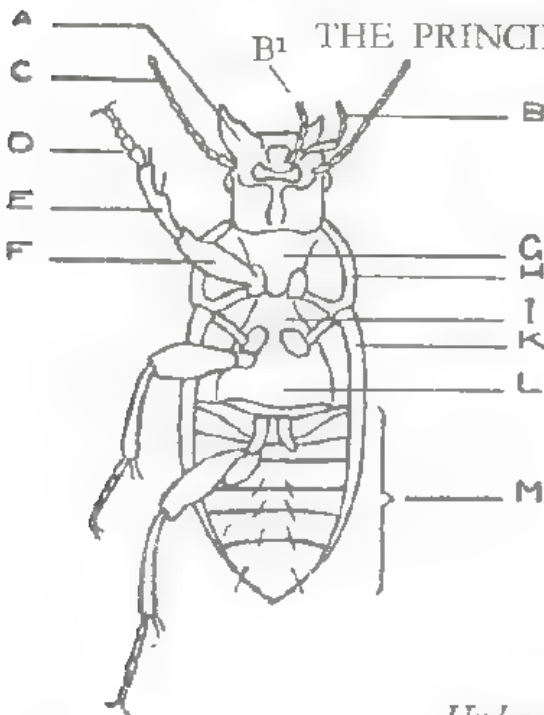
More obscure are the senses, believed to rest mainly in certain delicate static organs in the antennae, by means of which an insect maintains its balance and position when in flight, when swimming or otherwise moving about. If the antennae of a butterfly are removed its flight control is completely destroyed; similarly if those of a Whirligig Beetle are removed it can no longer avoid colliding with objects on the surface of the water on which it swims. As very many insects have a capacity for producing sounds (stridulation), which are not always perceptible to the human ear, it is a legitimate assumption that they should also have the means of hearing them. It is by means of the latter that ants and some caterpillars perceive the sounds that cause them sometimes to 'stop in their tracks' and 'freeze'.

Reference was made above to insects taking to flight to escape their enemies. Insects have many enemies, ranging from bacteria, and fungi to fish, birds and mammals. Against the former they have no defences. Against vertebrates their principal defences are evasion and deception, though more active methods are not rare. There are bugs which emit pungent odours and liquids, ants that liberate formic acid, caterpillars covered with stinging hairs, even butterflies that are seldom eaten because of their unpleasant flavour, and the Bombardier Beetle fires at its enemies a charge of formic acid attended by an audible explosion. Sudden changes of attitude and appearance (terrifying behaviour) are adopted by many insects; for example, the caterpillar of the Elephant Hawk Moth becomes a snake's head, that of the Lobster Moth changes into a giant spider, the Devil's Coach Horse Beetle transforms into a scorpion, the Eyed Hawk Moth opens its wings to display two large staring eyes, and so on. Amongst the more familiar ways of evading enemies is what has come to be known as camouflage: the insect

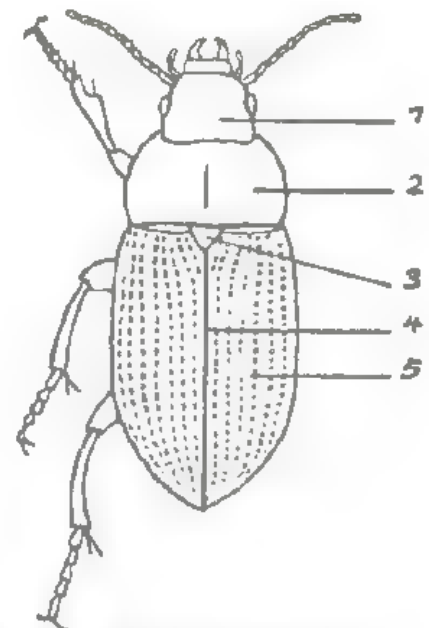
escapes detection by resembling some part of its environment to the point of deception. Good examples are the 'stick' caterpillars of Geometrid moths and the mottled patterns of most moths that rest by day on tree trunks. Light and shade are also made use of but, naturally, all protection is lost the moment the insect moves. Protective resemblance to inanimate objects is indeed widespread in the insect world. Less common is its further development, known as mimicry, in which an unprotected insect comes to resemble some other insect which, perhaps because of its taste or its sting, enjoys a measure of immunity from attack by insectivorous animals. Examples of both these methods of self defence, evolved by the operation of natural selection, are illustrated on Pages 65 and 66. Of all methods used by insects to avoid their enemies the commonest, naturally, is simply by hiding in nooks and crannies, inside the stems of plants, under rocks and stones, in deliberately constructed cases of silk, leaves and debris, or simply in the soil.

Fascinating as are the protective devices of insects against the attacks of the larger animals and instances could be multiplied indefinitely - they are of no avail against other insects, which are their most dreaded enemies. In the British Isles some 20,000 different kinds of insects are to be found. Of these about 4,000 are exclusively parasites in or on other insects and at least as many others prey upon other insects in one stage or another. One might with some justification say that one half of the species live at the expense of the other half. Cruel as this is, it is probably true that, were it not so, man's chances of survival in these islands would be decidedly precarious; so high is the rate of reproduction of insects that, were their increase uncontrolled, in two or three years they would destroy all other life. When considering the animals of the countryside in the British Isles one is prone to think only in terms of birds, a few mammals, frogs, toads, snakes, fishes, snails and so on. It is seldom realised that the insects far outnumber all these both in numbers of species and, even more, in individuals. Taking the world as a whole insects outnumber all other species of animals by at least four to one. They hold in fact a dominant position in the animal kingdom. It is interesting to speculate why this should be so, what special attributes they possess that may have conferred special advantages on them in the struggle for existence. Briefly, these would seem to be their small size, their adaptability and their power of flight. Their smallness enables large numbers of them to flourish on extremely small quantities of food: a number of minute parasitic wasps may successfully reach maturity in a single Hawk Moth egg, a weevil will undergo its whole development in a single grain of wheat; many larvae find all their needs between the two surfaces of a small leaf. Correlated with this is the shortness of their life cycle, which seldom lasts more than one or two years and may be as short as a matter of days. Their adaptability to their environment is remarkable. No other class of animals has so successfully colonised the land, from pole to pole, as the insects, living in both arctic cold and desert heat, thriving at altitudes that man can barely tolerate, inhabiting petroleum pools and living and breeding in such substances as opium, pepper and strychnine. The tough impermeable cuticle which forms the insect's exoskeleton not only prevents the drying up of the soft internal parts but also provides a covering, both flexible and yet of relatively immense strength; and the wings provide means of dispersal to new areas, of finding food and a mate. It is small wonder that insects have indeed colonised the earth, that every single acre of fertile country holds several millions of them.

# THE PRINCIPAL PARTS OF AN INSECT



*Under side of a beetle (left)*



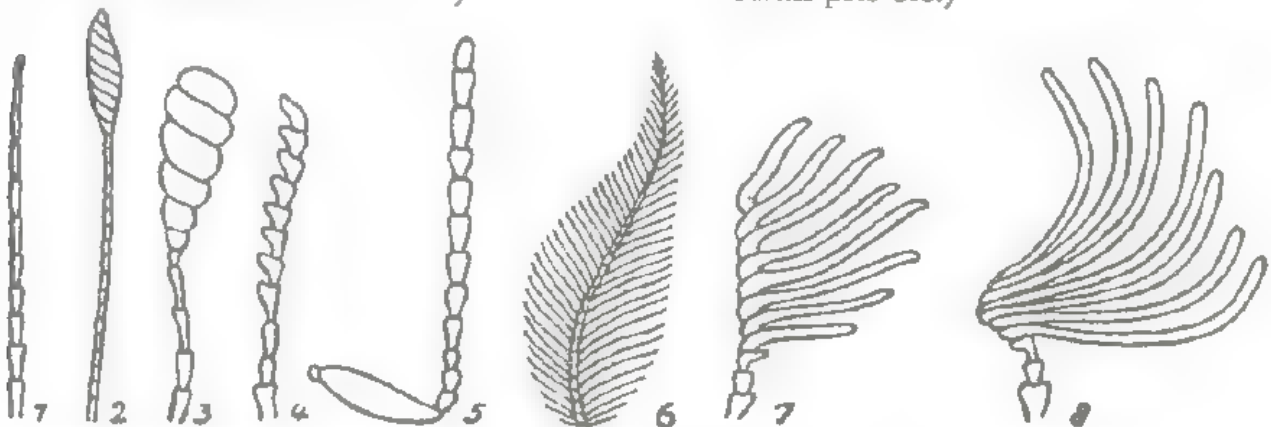
*Upper side of a beetle (right)*

- A Mandible (jaw)
- B, B¹ Palpi (organs of touch)
- C Antenna (feeler)
- D Tarsus (foot)
- E Tibia (shank)
- F Femur (thigh)

- G Prosternum (fore part of thorax)
- H Edge of thorax
- I Mesosternum (middle part of thorax)
- K Edge of elytron (wing cover)
- L Metasternum (rear part of thorax)
- M Abdomen

- 1 Head
- 2 Prothorax (fore part of thorax)
- 3 Scutellum (only visible part of middle section of thorax)

- 4 Elytral suture (line of contact of the two elytra)
- 5 Elytron, showing striae (lines of small pits etc.)



*Types of Antennae*

- 1 Filiform (thread like)
- 2 } Capitate (clubbed)
- 3 }
- 4 Serrate (toothed)

- 5 Geniculate (elbowed)
- 6 Bipectinate (feathery)
- 7 Pectinate (combed)
- 8 Lamellate (fan-leaved)



# CLASSIFICATION

Classification of any group of animals serves two purposes. First, it provides a method of giving convenient and universally acceptable names to all the species, and secondly it shows how these species are related to one another. The animal kingdom is, for these purposes, divided first into a number of *Phyla*, one of which, the Phylum *Arthropoda*, includes all such animals with jointed feet as insects, spiders, mites, crabs, lobsters and shrimps. One of the subdivisions of this Phylum is that containing the true insects. This is the Class *Insecta*. Within this Class there are recognised twenty four major divisions called Orders, the chief characteristics and the names of which follow. The working entomologist, however, is mainly concerned with the next three categories, namely the family, genus and species. The last two provide the scientific name of an insect, such as is used for each insect illustrated in this work; and each family is an important group of genera within an Order.

To take an example, the Swallow Tailed Butterfly has the scientific name *Papilio machaon*. This implies that it belongs to:

the species	<i>Machaon</i>	the order	Lepidoptera
the genus	<i>Papilio</i>	the class	Insecta
the family	Papilionidae	the phylum	Arthropoda

thus, by the combination of two words only, it is given a name different from that of any other animal, and it is placed correctly in the system of classification. The twenty-four Orders of Insects commonly accepted by entomologists are as follows:-

## *Class Insecta*

### Sub-class Apterygota (primitive wingless insects)

- I **Diplura. Bristle-tails**  
Mostly minute soil inhabiting insects, eyeless and showing affinities with millipedes. Unlikely to be found except by special collecting methods  
12 British species.
- II **Thysanura. Bristle-tails**  
Like Diplura, but with compound eyes. The Silver Fish is a good example of the Order.  
11 British species. *Fig. 1.*
- III **Protura. No popular name**  
Minute soil insects, about 1 mm long. Eyeless and with piercing mouth parts.  
17 British species.

#### IV Collembola. Spring-tails

Quite small wingless insects sometimes met with in vast swarms. They can always be recognised by having suckers on the underside of the abdomen, just between the legs; and most of them also have under the body a forked springing organ which enables them to jump considerable distances.

261 British species.

### Sub-class Pterygota (Winged Insects)

#### *Division 1. Hemimetabola (with incomplete metamorphosis)*

V Orthoptera. Crickets, Grasshoppers, Stick Insects etc. These familiar insects are well illustrated by *Figs. 2-7, 262.*

38 British species.

VI Isoptera. White Ants. Also called Termites.

No British species.

VII Plecoptera. Scone flies

32 British species. *Fig. 11.*

VIII Embioptera. Web-spinners

No British species.

IX Dermaptera. Earwigs

All the 9 British species are much like the Common Earwig illustrated in *Fig. 2.*

X Ephemeroptera. Mayflies

The 46 British species are very similar to the Mayfly illustrated (*Fig. 10*) though most of them are much smaller.

XI Odonata. Dragonflies

42 British species. *Figs. 8-9, 263.*

XII Psocoptera. Booklice and allies

These insects are rather suggestive of aphids, and are about the same size. They are most easily distinguished by having biting mouth-parts in place of the sucking beaks of the latter. Many species are winged.

60 British species. See *Fig. 30.*

XIII Anoplura. Lice

286 British species, mostly found on birds. *Fig. 24.*

XIV Thysanoptera. Thrips

Small slender insects with long-fringed wings and stylet-like mouth-parts. Common on flowers.

183 British species.

- XV Hemiptera. Bugs  
Several samples of these familiar insects, characterised by their sucking beaks, are shown in *Figs. 12-23*.  
1411 British species.

*Division 2. Holometabola (with complete metamorphosis)*

- XVI Neuroptera. Alderflies, Lacewings etc.  
The rather frail translucent net-veined wings are very characteristic of these insects.  
54 British species. *Figs. 25-26*.
- XVII Mecoptera. Scorpion Flies  
Only 4 British species. *Figs. 28-29*.
- XVIII Trichoptera. Caddis Flies  
Caddis Flies are often mistaken for moths, but can at once be distinguished because they have no scales on the wings and no proboscis.  
188 British species. See *Fig. 27*.
- XIX Lepidoptera. Butterflies and Moths  
2187 British species. *Figs. 110-193, 265-6*.
- XX Coleoptera. Beetles  
3690 British species. *Figs. 31-109, 267*.
- XXI Strepsiptera. Stylops  
Very rare minute parasites on bees and some bugs. Males with only the hind wings present; females sack-like internal parasites.  
17 British species.
- XXII Hymenoptera. Sawflies, Ants, Bees and Wasps, Ichneumon Flies.  
6190 British species. *Figs. 222-252*.
- XXIII Diptera. Flies (with only two wings)  
5200 British species. *Figs. 194-219*.
- XXIV Siphonaptera. Fleas  
47 British species. *Figs. 220-221*.

## DESCRIPTIONS

In the descriptions that follow the first name is the popular (English) name, the second the scientific name. The latter always consists of two words which are either Latin or latinised words. Immediately following them is the name of the author who described the insect and gave it the name quoted. The authors' names are given in full except in the case of Carl von Linne, who originated this binominal system of nomenclature and for whom the simple abbreviation 'L' is always used.

As some of the insects illustrated are much enlarged and others figured are less than natural size, reference should always be made to the text to discover the correct size. In scientific literature measurements are always given in millimetres, and this system is adopted here, except in the case of the butterflies and moths. The sizes for these can easily be converted into millimeters by multiplying by 25. Measurements of length do not include the antennae. The range of each species within the British Isles is only indicated in general terms, as the exact distribution is not yet fully known of many of the species illustrated.

### THYSANURA - Bristle-tails

- 1 Silver Fish, *Lepisma saccharina* L. 10-15 mm.

A rather spindle shaped insect, tapering towards the tail, which bears three long fine bristles. Pale silver-grey. Very active. Occurs mostly indoors in larders, bathrooms, kitchens and amongst books and papers. Feeds on starchy substances and is sometimes common among stored food products. Widely distributed.

### ORTHOPTERA

#### Earwigs, Cockroaches and Grasshoppers

- 2 Earwig,  
*Forficula auricularia* L. 10-14 mm.

This well known and common insect hardly needs description. Though seldom seen flying it does in fact fly well, and when alighting folds its membranous wings fan-wise very quickly and uses the pincers on the hind end of the

body to help tuck them into place beneath the short wing covers. The female 'broods' over her eggs, which is remarkable in so lowly an insect, and cares for the young till they can look after themselves. Usually found in crevices and holes near ground level, and old hollow plant stems. Often damages growing plants but also feeds on small insects. There is no authentic record of the insect entering the ear, as the name suggests. Common throughout the British Isles.

- 3 Lapp Cockroach,  
*Ectobius lapponicus* L. 7-11 mm.

Brown, paler along the sides and with a darker mark in the middle of the thorax. The elytra completely covering the wings and body in the male; elytra much shorter and wings almost absent in female. Southern England.

- 4 German Cockroach,  
*Blattella germanica* L. 11-13 mm.

Yellowish brown with two dark stripes



on the thorax. Flattened, with long thread-like antennae. Very active. Elytra completely cover the body in both sexes. An introduced species now common in bake-houses, hotel kitchens and centrally heated premises. Sometimes in rubbish tips where conditions are warm enough.

The Common Cockroach *Blatta orientalis* L. or 'Black Beetle' is larger than either of the two species illustrated, broader and much darker in colour with short or very short elytra. Both species are nocturnal.

#### 5 Common Grasshopper,

*Chorthippus bicolor* L. 17-20 mm.

General coloration brownish, mottled with lighter and darker shades but very variable. Tip of body generally reddish. Elytra and wings covering the whole body. Very active, flying and leaping. Common throughout British Isles.

#### 6 Wart-biter, *Decticus verrucivorus* L. 35-45 mm from head to wing tip.

Green with brownish spots on elytra and hind legs. Hind legs almost twice as long as body. Rare in Britain, and only in southern counties.

#### 7 Great Green Grasshopper,

*Tettigonia viridissima* L. 45-55 mm.

Clear green without markings. Antennae long and slender. Elytra extending beyond body. Sings loudly, often far into the night, by rubbing elytra together. The largest British grasshopper, widespread in southern counties especially in coastal districts.

### ODONATA - Dragonflies

#### 8 Brown Aeshna,

*Aeshna grandis* L. Length from head to tail 70-75 mm.

Brown with yellow marks on side of

thorax and small blue or yellow spots on abdomen. Wings faintly brownish and held flat when at rest. Swift and competent flyer, catching prey on the wing. The larva (or nymph) lives in still water and is exceedingly rapacious, feeding on insects, and even very small fish, which it catches with its extensile pincers or 'mask'. When the nymph is fully fed and the dragonfly due to emerge from it, it climbs out of the water onto the stem of a water plant. After the dragonfly has emerged and flown away, the empty nymph-case is left clinging to the plant. Often found flying far from any water. Common in Southern England, rare elsewhere.

#### 9 The Demoiselle, *Agrion virgo* L.

Length from head to tail 45 mm.

Head and body of male metallic blue; of female metallic green. Wings of male iridescent bluish brown; of female pale brown. A slow flyer and rests with wings closed over the back. Always flies over or very near water. Nymph in running water. Common locally in southern England, Wales and Ireland.

### EPHEMEROPTERA - Mayflies

#### 10 Mayfly, *Ephemera vulgata* L.

Wing spread 32-38 mm.

Dull yellow to pale brown; wings glistening with a dense network of veins. Three long filamentous tails. Mouth parts atrophied so that the mayfly takes no food. It mates in the air during evening swarms and lives only a few hours. Eggs dropped into water. Nymph rather like adult but with gills and no wings. When full fed, after about a year, climbs out of water and changes into a winged pre-adult which moults yet again before being able to fly.

## PLECOPTERA - Stoneflies

- 11 **Stonefly**, *Perla cephalotes* Curtis  
Wing span 50-55 mm.

Brown, wings held flat over back when at rest. Nymph only in running water, under stones or amongst gravel, and having only two filamentous tails. Adult sluggish, always near water.

## HEMIPTERA - Bugs

- 12 **Water Scorpion**, *Nepa cinerea* L.  
Length, including breathing siphon, about 35 mm.

Predacious, the first pair of legs serving as pincers. Under the wing-covers (elytra) are purplish wings, but the insect does not fly as it has no wing muscles. Lives entirely in rather shallow muddy waters. Throughout British Isles, but rare in north.

- 13 **Water Boatman**,  
*Notonecta glauca* L. Length 15 mm.

Hindlegs modified to form excellent 'oars' fringed with long hairs, and the back 'keeled' as the insect always swims on its back. Dives and flies readily and is carnivorous. Common throughout the British Isles.

- 14 **Great Pond Skater**, *Gerris naias* Degeer. Length 13-17 mm.

The front legs are used for seizing prey, the other two pairs for 'skating' over the surface of the water in a characteristic jerky fashion. Dives very rapidly. Wingless. Throughout the British Isles, except Scotland.

- 15 **Lesser Water Boatman**,  
*Corixa punctata* Illiger  
Length 10-15 mm.

Dark greenish or blackish brown, darker than the Water Boatman; not keeled on back and not swimming on

its back, and more often below the surface. Flies by night and feeds on diatoms, algae etc. Throughout the British Isles.

- 16 **Bed Bug**, *Cimex lectularius* L.  
Length 5 mm.

Wingless in both sexes and all stages, and very flat except after feeding. Blood-sucking and almost exclusive to man. Has faint, unpleasant odour. Hides by day in crevices of woodwork, behind wall paper and in similar places. Formerly common throughout the British Isles, but the use of modern insecticides, especially D.D.T., has greatly reduced its numbers.

- 17 **Beadle or Soldier Bug**,  
*Pyrrhocoris apterus* L.  
Length 8-9 mm.

Occurs in both winged and wingless forms, the former exceedingly rare in England. Very rare in southern England, but sometimes abundant locally. Attached to mallow.

- 18 **Toothed Shield Bug**,  
*Pictomerus hident* L.  
Length 10-12 mm.

The name refers to the pointed shoulders. Found on most trees and shrubs in rather damp places, where it feeds voraciously on other insects, even caterpillars larger than itself. Found throughout the British Isles.

- 19 **Blood-red Shield Bug**,  
*Acanthosoma haemorrhoidale* L.  
Length 12 mm.

Pale shining brown. It takes its name from the bright red bands on its body, which are conspicuous when it takes to flight. Occurs on many trees and shrubs, but especially hawthorn. In Britain it occurs in the southern counties only.

**20 Cabbage Shield Bug,***Eurydema oleraceum* L.

Length 6-7 mm.

Green with markings which may be either red or whitish. Feeds mostly on low-growing plants of the Cabbage family, but in the British Isles is never common enough to do any damage. In Britain, it is found in the southern counties only.

**21 Alder Frog-hopper,***Aphrophora alni* L. Length 12 mm.

One of a group of several species of Frog-hoppers all of which, when nymphs, produce the well known cuckoo-spit found on many plants. This species occurs chiefly on alder and willow. The frothy cuckoo-spit is derived from surplus fluid sucked out of plants by the nymphs and discharged from the tip of the body. Generally common.

**22 Mealy Plum Aphis,***Hyalopterus arundinis* Fabricius

Length 2 mm.

A very distinct *Aphis* which is characterised by its mealy covering. Attacks plum trees and causes the leaves to curl. Its alternate host plants are water grasses and rushes to which the winged individuals fly. Has many generations during the year, some of which reproduce parthenogenetically ('virgin birth'), others after pairing. The last autumn generation at least consists of both males and females, winged, which return to the plum trees and there lay over-wintering eggs. A five per cent tar-distillate winter wash applied in December or January is the best antidote.

**23 Scurvy Scale,***Aulacaspis rosae* Bouché

Length 15-25 mm.

The stems of roses are sometimes so

infested with this scale insect as to appear whitish. The rounder scales are those of the females, the longer narrower ones those of the male. Males with wings appear in early summer. After mating, both sexes settle on the rose stems from which they suck the juice, and quickly secrete the material which hardens to form their protective coverings.

**ANOPLURA - Lice****24 Head Louse, *Pediculus humanus* L.**

Length 1-2 mm.

A dirty grey-coloured insect that can only live on man. Has two distinct strains one of which lives among the hair of the head, the other on the body. Its eggs are known as nits and are attached to hair, to which the insect's claws are suitably adapted for clinging. To feed, it punctures the skin of the host and sucks blood. Is a great danger to health as it is capable of transmitting such serious diseases as typhus. Easily controlled by the use of D.D.T. powders.

**NEUROPTERA - Lacewings****25 Green Lacewing, *Chrysopa carnea* Stephens.** Wingspread 25-30 mm.

The translucent green wings and golden eyes are very characteristic. Both larvae and adults feed chiefly on Aphids. The eggs are attached to the tops of long thin stalks, to escape being eaten by other insects. The operations of making the stalk and laying the egg on the top of it are performed all in one movement. The fly is common everywhere.

**26 Giant Lacewing,***Osmylus fulvicephalus* Scopoli

Wingspread 44-48 mm.

The head is orange the eyes greenish-

black. There are a few pale markings on the black thorax and abdomen. Wings hyaline with brown spots. The larvae live in wet moss, feeding on the grubs of small flies in the mud. The adults occur amongst dense vegetation along woodland streams in England and Wales, Ireland and Scotland but are local and rare.

### TRICHOPTERA - Caddis Flies

- 27 **Great Red Sedge,**  
*Phryganea grandis* L.  
Wing spread 35-60 mm.

This is the largest British Caddis Fly, and its English name is that used by fishermen. It flies at dusk mainly and is very much like a moth, but has no scales on its wings. The forewings are narrower but tougher than the hind wings. Its grub lives in water in a case made of fragments of sticks and stems of plants, feeding on other small insects, worms etc. It is a common insect, found near water throughout the British Isles.

### MECOPTERA - Scorpion Flies

- 28 **Snake Fly,**  
*Raphidia notata* Fabricius  
Wingspread 25 mm.

This curious black-bodied insect derives its name from the way it moves when in search of prey. The long neck is really the first segment of the thorax, not a true neck, and is very flexible. Its grub lives under the loose bark of trees and in rotting wood, feeding on soft-bodied creatures that inhabit such places. It is not common, and in England occurs only in the southern counties

- 29 **Scorpion Fly,**  
*Panorpa communis* L.  
Wingspread 25-30 mm.

When disturbed, the male curls the tip

of the abdomen up like a scorpion; but it is quite harmless. It feeds on small dead insects, its pointed head, with the mouth at the tip, being well suited for the purpose. Its grub lives in the soil, and it is a common insect throughout the British Isles.

### PSOCOPTERA - Booklice, Psocids

- 30 **Book Louse,**  
*Liposcelis divinatorius* Mueller  
Length 1.5 mm.

Its colour is light brown, and it is entirely wingless. Though often found running about among old papers, amongst insect collections and in similar places, it is not really a louse. It feeds on minute moulds and mildews, and its presence indicates dampness and lack of ventilation. An allied species can make a faint noise by tapping with its body and hence is sometimes called the 'Death Watch'.

### COLEOPTERA - Beetles

- 31 **Tiger Beetle,**  
*Cicindela campestris* L. 12-16 mm.

An extremely active and very beautiful beetle. As rapid in flight and in taking to flight, as a bluebottle, for which it is easily mistaken on the wing. Its colours are best seen when slightly magnified. It has a faint, rather agreeable odour, and is highly predacious in all stages. Found in warm sandy banks and such places through the British Isles where its grub inhabits burrows about a foot deep.

- 32 **Woodland Ground Beetle,**  
*Carabus nemoralis* Mueller  
22-26 mm.

One of the larger common ground beetles to be found in the country and in gardens and parks in towns. The thorax is purplish, the elytra more



brassy or coppery. Nocturnal, hiding by day under stones and debris of all kinds. Predacious in all stages. Throughout England, Ireland, Wales and Scottish lowlands.

**33 Burrowing Ground Beetle,**  
*Clivina fossor* L. 55-65 mm.

A rather small ground beetle, the thorax markedly separated from the elytra. Forelegs shaped for digging. Frequents damp situations where it burrows in the mud; rarely found in the open, but generally common from Scottish lowlands southward.

**34 Shiny Ground Beetle,**  
*Harpalus aeneus* F. 8.5-10.5 mm.

The elytra vary from black to brassy, and may be purplish, green or bluish; the legs and antennae are red. Abundant in fields, preferring rather dry places, under stones, etc. throughout Britain.

**35 Giant Water Beetle,**  
*Dytiscus marginalis* L. 30-35 mm.

Beautifully shaped for swimming rapidly in water, the hind legs in particular being shaped rather like oars, fringed with long hairs. The wing covers (elytra) of the male are smooth, those of the female deeply furrowed. Part of the foreleg of the male is shaped to form a 'sucker' with which the female is grasped during mating. Both larva and adult are highly predacious, and the latter is a strong flyer when out of the water. Throughout British Isles.

**36 Whirligig, *Gyrinus substriatus***  
Stephens 5-7 mm.

These extremely wary and active beetles are very aptly named. They swim endlessly round and round on the surface of streams and pools usually in groups looking like gyrating drops

of molten metal. The middle and hind legs are especially adapted for swimming, the front pair being long and slender. The eyes are divided, the upper half to see above the water surface, the other below. Very common in southern England especially.

**37 Black Rove Beetle,**  
*Stenus biguttatus* L. 4.5-5 mm.

This species and the next are representatives of the great family of Rove Beetles of which nearly four hundred different kinds are found in the British Isles alone. They are very easily recognised by their narrow shape and very short elytra. A local species found chiefly in sandy places by streams and shores from southern Scotland southwards. The best known species in the family is the big jet-black 'Devil's Coach Horse'.

**38 Red-backed Rove Beetle,**  
*Staphylinus caesareus* Cederhjelm  
14-20 mm.

This species may sometimes be seen settling on hot pathways in the spring; also to be found under stones, clods of earth etc. Its red elytra are very conspicuous. Scottish Lowlands southwards.

**39 Ant-nest Beetle,**  
*Claviger testaceus* Preysslér  
2-2.5 mm.

This oddly shaped beetle is very small and uniformly yellow. It lives as a guest in the nest of the small yellow ants (*Lasius*) which are found under stones and in similar places, and feeds largely on their grubs. Mostly in chalky districts in Southern England.

**40 Glow-worm, *Lampyrus noctiluca* L.**  
11-12 mm; female 12-18 mm.

The male looks rather like a small 'Sailor Beetle', is fully winged and has

full sized elytra. The much bigger female looks more like a beetle grub than a fully grown beetle. All stages feed upon snails and all are more or less luminous: but it is especially the full-grown female that is the well known glow-worm to be seen often in damp ditches and hedge sides, the light being produced mainly from underneath the tip of the abdomen. England to the Scottish lowlands, local.

**41 Sailor Beetle, *Cantharis fusca* L.**  
11-15 mm.

This common and active beetle flies freely in the sun. It has close relatives, in which the wing covers are brown, known as Soldier Beetles. All are predacious in all stages, and will even attack each other, although their wing cases and horny exterior are rather soft in comparison with most beetles. Southern England.

**42 Ant Beetle,**  
*Thanasimus formicarius* L.  
7-10 mm.

So-called because of its ant like appearance and behaviour. Not actually associated with ants. Both as grub and beetle it attacks bark-boring beetles, and is usually found running about on fallen timber and logs. England to southern Scotland, but local.

**43 Brassy Pollen Beetle,**  
*Meligethes aeneus* F. 1.5-2.7 mm.

There are many species, even in the British Isles, of these small Pollen Beetles, and because in all stages they live on flowers, some of them are troublesome. They are very difficult to distinguish, but in all of them the elytra leave the extreme tip of the abdomen exposed. Common throughout Britain.

**44 Seven-spot Ladybird,**  
*Coccinella septempunctata* L.  
5.5-7.5 mm.

This is the largest British ladybird beetle, widely distributed in all kinds of country. In all stages it feeds on aphids and is a most useful insect.

**45 False Ladybird,**  
*Chilocorus renipustulatus* Rossi  
4-5 mm.

Might be mistaken for a variety, of which there are many, of the very common Two-spot Ladybird, with the colours reversed; but it is rounder. Like the true ladybirds, it feeds on aphids, and is a beneficial insect. Southern England.

**46 Bacon Beetle,**  
*Dermestes lardarius* L. 7-9 mm.

Modern hygiene and storage methods have rendered this insect much less common than it used to be. It is by no means confined to bacon as a food and will eat almost any dead dry animal matter, especially hides. When disturbed it folds in its legs and antennae and presents a very perfect oval outline.

**47 Fur Beetle, *Attagenus pellio* L.**  
4-5.5 mm.

A close relative of the last species but, as the name implies, has a preference for furs. It will also attack woollen goods and may do serious damage in the home, and especially in warehouses where the goods are not frequently disturbed. Throughout Britain.

**48 Common Burying Beetle,**  
*Necrophorus vespillo* L. 12-22 mm.

Both this species and the equally common *Necrophorus investigator* have two red bands across the elytra, but whereas the front of the thorax in *N. vespillo* has patches of downy hair,

in *N. investigator* it is bare. England and Ireland, rarer in Scotland.

- 49 Black Burying Beetle,**  
*Necrophorus humator* Goeze  
18-25 mm.

This Beetle is easily distinguished from all the other Burying Beetles by being entirely black except for the tips of its antennae, which are red. It is widely distributed throughout Britain and often common.

- 50 Red-necked Sexton,**  
*Oeceoptoma thoracicum* L.  
12-16 mm.

It is not really the neck but the thorax that is red in this beetle, which is a rather flattened insect with distinct raised ridges running the length of its elytra. In carcases, fungi etc. throughout Britain.

### **51 Nature's Scavengers**

Any rotting carcase will attract burying beetles during the spring and summer when they are on the wing. Having found a suitable dead mouse or bird, for example, the beetles dig away the earth from underneath it so that the carcase gradually sinks deeper and deeper into the ground, the excavated earth being used to cover it on top. When it is buried, the beetles, which themselves feed on it, lay their eggs on it in the certainty that it will supply ample foodstuffs for their larvae when they hatch.

- 52 Lined Click-beetle,**  
*Agrotodes lineatus* L. 7.5-10 mm.

This narrow, dark brown beetle is less well known than its thin light brown wiry grub, which is the common wire-worm that does immense damage to the roots of grass, corn and many other crops. There are several other closely related species. When occurring togeth-

er in the soil they may build up a population totalling many millions per acre. Throughout Britain.

- 53 Scarlet Click-beetle,**  
*Elatér sanguineus* L. 12-17.5 mm.

One of the handsomest of the British Click-beetles, and especially associated with oak woods in the south of England. Click-beetles, or Skipjacks as they are sometimes called, are so-called from their habit of springing into the air with a clicking sound when turned on to their backs on the ground. Southern England, but very rare.

- 54 Comb-horned Upland Click-beetle,** *Corymbites pectinicornis* L.  
12-13 mm.

This very beautiful Skipjack is well described by its popular name, for its antenna when opened out are very comblike. It prefers hilly uplands, where its 'wire worm' larva feeds on grass roots in pastureland. It is a rather rare and local species, found in Britain in the Midlands and northward to Scotland.

- 55 Spider Beetle,** *Ptinus fur* L.  
2-4 mm.

This beetle is characteristic of a whole group of species, some of them much more spider-like in shape than the one illustrated. They curl up into a ball when they sham death. All are very liable to be troublesome in warehouses and wherever foodstuffs are stored for they and their larvae feed particularly on dead and dry animal and vegetable matter. Generally distributed.

- 56 Furniture Beetle,**  
*Anobium punctatum* De Geer  
3-4 mm.

Known in the furniture trade as 'worm', this beetle makes the charac-

teristic holes in old furniture, and often in new wood. The grub tunnels inside the wood, and produces quantities of fine powder which sometimes falls to the ground in severe attacks. The holes are made by the fully grown beetle when it emerges from the wood (when the damage is done!) to find a mate and so to repeat the process. The eggs are laid in tiny cracks on the surface of the wood. A common insect in woodlands, as well as in furniture.

**57 Oil Beetle, *Meloe proscarabaeus* L.**  
13-32 mm.

This wingless and rather ungainly beetle is chiefly interesting on account of its curious life history. When handled it exudes a clear yellow oil from its joints. The females lay enormous batches of minute eggs in small holes in the ground. The tiny grubs when they hatch are exceedingly active and if possible find their way into flowerheads that are visited by bees, for their sole chance of survival rests upon their attaching themselves to a bee and so being carried to its nest. Once in the nest the grub changes to a sluggish creature which proceeds to devour the food stored up by the bee for its own young. Widely distributed in southern England, rare northwards.

**58 Cellar Beetle, *Blaps mortisaga* L.**  
20-30 mm

This black, slow-moving beetle is aptly named. It is associated with dark damp places such as cellars, old-fashioned sculleries, stables and out-buildings. The one illustrated is a rare species only found occasionally in the north of England. Like the similar and much commoner southern species, *Blaps mucronata*, it has a distinctly unpleasant smell.

**59 Mealworm Beetle, *Tenebrio molitor* L.** 14-16 mm.

This insect is much less familiar than its grub, which is the well known mealworm commonly bred in quantities as food for small birds and other insectivorous animals. It can be very troublesome when infesting warehouse stores of grain or flour.

**60 The Tanner, *Prionus coriarius* L.**  
24-40 mm.

The thorax of this handsome 'Long-horn' has three short spines on each side. The adult flies chiefly at night. The larva bores in the wood, especially in the roots, of oak, beech, birch and pine growing in rather damp situations, doing considerable harm to the trees. Southern England and Wales to Midlands.

**61 Red-brown Long-horn Beetle, *Leptura rubra* L.** 12-18 mm.

The sexes of this brightly coloured longicorn, as shewn in the illustrations, are different in coloration. Its larvae are wood-borers, like those of most long-horn beetles. It attacks exclusively coniferous trees. Occurs sporadically, possibly as an 'escape' from imported timber.

**62 Four-banded Long-horn Beetle, *Strangalia quadrifasciata* L.**  
13-18 mm.

This handsome longicorn occurs rarely in southern counties at elder blossom and some other flowers in summer. Its larva feeds in the dead and decaying wood of oak, alder, poplar and birch, especially old stumps in moist situations. Rarer northwards.

**63 Short-winged Long-horn Beetle, *Molophilus minor* L.**  
8-13 mm.

Though small, this beetle is conspi-

cuous for its very long antennae and much shortened elytra. Its larva burrows principally in broken branches of pine, larch and spruce and in the stacked wood of these trees. Southern England; local.

**64 Violet Long-horn Beetle,**

*Callidium violaceum* L. 10-15 mm.

This beetle has a blue and violet sheen. Formerly it was a great rarity in Britain but is now much commoner. Its larva burrows between the bark and the sap-wood of felled coniferous trees such as larch, spruce and pine, often doing much damage to palings, posts and rustic work that have not been stripped of their bark. Southern counties to Midlands, rare, possibly not indigenous.

**65 Firewood Long-horn Beetle,**

*Spondylis buprestoides* L.  
15-24 mm.

Has been found only very rarely in Britain in timber imported from the Continent. Its larva burrows in various coniferous trees.

**66 Dusky Long-horn Beetle,**

*Crioccephalus rusticus* L. 12-16 mm.

Not so common in Britain as the very similar *Crioccephalus fesus*. Both have the similar habit of attacking the stumps, boles and roots of pine and larches recently killed or previously attacked by other wood boring beetles.

**67 Chestnut Long-horn Beetle,**

*Tetropium castaneum* L. 10-18 mm.

The beetle illustrated is found occasionally in imported timber. The very similar *T. gabrieli* Weise occurs in many pine, larch and spruce plantations, where its larva lives just under the bark and in the outer sapwood of sickly trees, seldom attacking healthy ones.

**68 Musk Beetle, *Aromia moschata* L.**  
18-32 mm.

The scent of this Long-horn is so strong that it can often be noticed at some distance from the trees which it affects, principally old willows and salwos in which the larvae bore. The beetles are usually green, but may be bluish, and fly freely in the sun in June and July and in some places in southern England are quite common; extends to Ireland and Scottish Lowlands.

**69 House Long-horn Beetle,**

*Hylotrupes bajulus* L. 10-20 mm.

Attacks dry seasoned wood of coniferous trees such as the roof timbers of houses, posts and dead trees. Formerly rather a rarity, it has become a serious pest in some outlying parts of Greater London. Its larva may bore in timbers for several years without disclosing its presence, completely hollowing them. Control is very difficult, and prevention of attack by treatment of timbers, before or during erection is thus recommended. The blackish beetle flies freely in hot, sunny weather.

**70 Large Poplar Long-horn,**

*Saperda carcharias* L. 18-28 mm.

This is another Long-horn that attacks poplar trees. Its grubs bore into the heart of the tree and thus may render the timber commercially worthless. The adult female lays her eggs usually near the base of young trees; if this is protected attack may be prevented. Southern England to the Midlands; scarce.

**71 Timberman,**

*Acanthocinus aedilis* L. 12-20 mm.

The astonishingly long antennae of this beetle, especially in the male, are its most remarkable feature. Apart from casual emergences from imported



timbers, such as pit props, it is found in old long-established pine woods, such as the Black Forest at Rannoch, where it may be seen flying freely and settling on old pine logs and tree stumps. The males are decidedly pugnacious. The larvae excavate wide galleries just under the bark, seldom damaging the wood of the tree except when making their pupal chambers.

**72 Pine-bark Long-horn,**

*Rhagium inquisitor* L. 12-18 mm.

This Long-horn is rather similar to the Timberman but smaller, with much shorter antennae. It is commoner, is quite active and has a very characteristic 'watchful' resting attitude. The larvae live under the bark of conifers, excavating galleries on the surface of the wood; they prefer dead or dying timber. Found in Scotland and northern England.

**73 Water Jewels, (*Donacia* F.)**

**73a** *Donacia aquatica* L. 6-10 mm.

**73b** *Donacia clavipes* F. 7-12 mm.

**73c** *Donacia cinerea* Herbst  
7-11 mm.

**73d** *Donacia crassipes* F. 9-13 mm.

The illustrations give but a poor idea of the beauty of these beetles which, when seen alive on a water lily leaf among rippling water, are truly living gems. They are all attached to water plants, such as reeds and sedges of various kinds, in the stems in which the larvae live. All are rather local, though sometimes numerous where they occur. Most frequent in southern counties of England.

**74 Scarlet Lily Beetle,**

*Lilioceris lili* Scopoli 6-8 mm.

The vivid scarlet of this beetle soon fades after death. It sometimes damages ornamental lilies, on the leaves of

which it lays its eggs, glued together. The larva has the curious habit of covering its back with its own dried faeces as a protection, possibly, against its enemies and the sun. Rare, in southern England.

**75 Four-spot Willow Beetle,**

*Phytodecta viminalis* L. 5.5-7 mm.

The black spots of this brick red beetle vary considerably in size, shape and number. It is commonly to be found on willow and sallow, on the leaves of which it feeds. Southern counties of England to Durham, local.

**76 Alder Leaf Beetle,**

*Agelastica alni* L. 5-7 mm.

This rather metallic coloured beetle is sometimes found on alders the leaves of which it riddles so as to cause considerable damage. Rare in England.

**77 Sallow Leaf Beetle,**

*Lochmaea catenae* L. 4-6 mm.

A small brownish beetle which devours the leaves of sallow, particularly of young trees. Southern England to the Midlands. The Scottish Heather Beetle, *Lochmaea suturalis* Thomson, is very similar.

**78 White Deadnettle Beetle,**

*Chrysomela fastuosa* Scopoli  
5-7 mm.

Golden green, the thorax and a stripe down the back and on each elytron blue or violet. Feeds on various nettles. Local but widely distributed.

**79 Red Poplar Leaf Beetle,**

*Melasoma populi* L. 9-11 mm.

The elytra red, otherwise blue-black or greenish, metallic. On young poplars, aspens and dwarf sallows. Locally common in England; rare in Scotland.

**80 Tansy Leaf Beetle,***Galeruca tanacetii* L. 6-10 mm.

Entirely black, dull or shining. Principally on tansy, but also on other plants. Throughout the British Isles, but not common.

**81 Turnip Flea Beetle,***Phyllotreta nemorum* L. 2.5-3.5 mm.

Its jumping habit and fondness for turnips give this tiny beetle its popular name. It sometimes does enormous damage by stopping the growth of the young plants. Occurs throughout the British Isles, in several broods each year. Modern insecticides keep it in check.

**82 Cabbage Leaf Beetle,***Haltica oleracea* L. 3-4 mm.

Generally metallic, shining green, but may be bluish. Found principally on *Brassica* (Cabbage) but also on some other plants, mostly in southern England.

**83 Tortoise Beetle,***Cassida nebulosa* L. 5-7 mm.

May be rust brown or greenish in colour, and is found chiefly on clover, beetroot and other low plants. Southern counties; rare.

**84 Vine Weevil,***Otiorrhynchus sulcatus* F. 9-13 mm.

General colour rather shining black, with patches of yellowish hairs. Lives on roots of plants etc. and may be injurious to vines (in countries where these are grown), strawberries etc. Midlands and southern England; rarely to southern Scotland.

**85 Silver-green Leaf Weevil,***Phyllobius argentatus* L. 5-6 mm.

The green colour is due to a covering of scales, mixed with hairs. Common

throughout the British Isles, on young birch, oak and other trees.

**86 Pea Weevil, *Sitona lineatus* L.**

3.5-5 mm.

Ground colour black, but covered with alternating lines of light and darker scales. Abundant throughout the British Isles, and from early spring to late autumn, on clover, peas, vetches and allied plants.

**87 Pine Weevil, *Hyllobius abietis* L.**

9-14 mm.

Pitch-black with patches of yellow scales. Common everywhere on pines and firs during summer months.

**88 Banded Pine Weevil,***Pissodes pini* L. 6-9 mm.

The band of yellow scales is characteristic. Found only in the northern counties and Scotland, rather rarely, on pines and fir trees.

**89 Grain Weevil,***Calandra granariae* L. 2.0-3.5 mm.

Only in granaries, bakeries and such places, where it is sometimes exceedingly destructive, feeding on stored grain. It is in fact *the* Weevil. The whole development, from egg to beetle, takes place within a single grain.

**90 Nut Weevil, *Balaninus nucum* L.**

5-8 mm.

On hazel, chiefly in southern England and the Midlands. Eggs are laid on the unripe nuts and the larvae feed in the kernels.

**91 Dark Blue Pine Weevil,***Magdalis violacea* L. 4-6 mm.

Larva on small branches of pine trees, of which the beetle damages the new shoots. Only in Scotland, and very rare.

**92 Apple Blossom Weevil,***Anthonomus pomorum* L.

3.4-4.5 mm.

Attacks the buds and flowers of apple and pear trees and often does great damage. Throughout the British Isles as far as southern Scotland.

**93 Clover Weevil,***Apion apricans* Herbst 2.5-3 mm.

Feeds on clover and is liable to occur wherever this grows wild or as a crop. Sometimes does considerable damage, skeletonising the leaves.

**94 Birch Leaf Roller,***Byctiscus betulae* L. 6-8 mm.

The female rolls the leaves of birch into characteristic tubes about two inches long and lays its eggs inside. The leaf rolls are to be seen also on hazel and poplar in southern England in spring and early summer; much rarer further north and in Scotland.

**95 Bark Beetle, *Crypturgus pusillus***  
Gyllenhal 1-1.5 mm.

Lives in the galleries formed by other and larger Bark Beetles in pine, larch and other coniferous trees and does not appear to be of any economic importance itself. Southern England, local.

**96 Pine Shoot Beetle,***Myelophilus piniperda* L. 4-4.5 mm.

Beetle bores into tender pine shoots and eats its way along the centre, causing the tip eventually to break off; larvae in burrows under the bark of live or decaying trees. Widespread, especially in the north, and causing considerable damage.

**97 The Pattern Maker,***Ips typographus* L. 4.5-5.5 mm.

This bark beetle attacks many kinds of coniferous trees, but fortunately is not

very common in Britain. The main tunnel is made by the parent female, the branch tunnels by the larvae. In a hot season there may be two or even three broods in a year.

**98 Stag Beetle, *Lucanus cervus* L.**

30-80 mm.

The male Stag Beetle is a not uncommon sight flying slowly high in the air over gardens in the London area in the evenings about June. The female is less often seen. The grub lives mainly in the stumps of old trees, especially oaks, and takes several years to reach full growth. Common in some southern counties; more rarely as far north as the Midlands.

**99 Lesser Stag Beetle,***Sinodendron cylindricus* L.

12-16 mm.

This small Stag Beetle has only a single horn, which curves upwards and backwards and bears long yellow hair to the rear. The female has only a trace of this horn. Flies at dusk and is distributed throughout the British Isles, though commonest in the southern counties. The grub lives in the rotting stumps of ash, beech, willow and other trees.

**100 Dung Beetle,***Aphodius fimetarius* L.

5.5-7 mm.

One of a number of very similar and closely related species all of which live and breed in dung. Common throughout Britain.

**101 Dor Beetle,***Geotrupes stercorarius* L.

16-24 mm.

Flies with a slow humming flight on warm evenings in summer and autumn. Larvae feed on dung in chambers dug by females to a length of a foot

or more below the dung and provisioned with dung carried down from above. Occurs throughout the British Isles.

- 102 Summer Chafer,**  
*Amphimallus solstitialis* L.  
14-18 mm.

Flies about hedges and trees at dusk, sometimes abundant locally, in the south and west of Britain. Larva feeds on roots of small trees and bushes, and at times is destructive to the roots of corn and grasses.

- 103 Cockchafer,**  
*Melolontha melolontha* L.  
20-30 mm.

Known also as the 'June Bug' this beetle is a very common sight in southern counties. Its 'bumbling' flight often brings it into houses. Its grub lives in the soil, feeding for three years on all kinds of roots, and is a pest to the gardener and agriculturist. Rather rare in northern England and Scotland.

- 104 Garden Chafer,**  
*Phyllopertha horticola* L.  
8-12 mm.

Like the Cockchafer this smaller chafer is an important pest, the grubs often doing extensive damage to turf by eating and destroying the roots. The beetle itself also damages the foliage of trees. Common throughout Britain.

- 105 One-horned Dung Beetle,**  
*Copris lunaris* L. 25 mm.

The closest British relation of the Scarab Beetle of Egypt, and like it, feeding on and breeding in dung. Sandy places in southern England, rather local.

- 106 Three-horned Dor Beetle,**  
*Typhaeus typhaeus* L. 12 mm.

The males vary a good deal in the size

of the horns. The female lacks them. Found chiefly under rabbit droppings; rather local and not found north of the Midlands.

- 107 Bronze Dung Beetle,**  
*Onthophagus vacca* L. 1.5 mm.

To be found locally only from Kent to Somerset, in dung. The female buries pellets of dung rather deeply in the soil, for the larvae to feed on. Like all dung-beetles, a very useful scavenger.

- 108 Rose Chafer,**  
*Cetonia aurata* L. 14-22 mm.

This very lovely beetle has its elytra so shaped that they can remain closed whilst the wings are in use. Its popular name is due to the fact that it feeds freely on the foliage of roses, as also indeed on that of many other shrubs and trees. The grubs live for two or three years in the soil, sometimes in ant's nests. Local in southern England becoming rarer northwards, and very rare in Scotland.

- 109 Bee Chafer,**  
*Trichius fasciatus* L. 9-13 mm.

Due to its covering of hair, this beetle has a rather downy appearance. A northern insect, more often met with in Scotland than in England, but not common anywhere. The grub lives in rotting stumps of birch, alder and other trees.

## LEPIDOPTERA

### Butterflies and Moths

- 110 Swallowtail, *Papilio machaon* L.**  
Expanse 3-3½ inches.

Confined in Great Britain to the fens and Norfolk Broads, where the caterpillar feeds on fennel. Just behind its head the caterpillar (shown in the figure) has a glandular defensive organ



called the osmeterium which it thrusts out when disturbed. Flies in June; sometimes again in August.

- 111 Marbled White,**  
*Melanargia galathea* L.  
Expanse 2 inches.

Not a true 'White' but related to the Meadow Brown. Flies in grassy places, especially on chalk downs in southern England, in late July or early August. Caterpillar feeds on Cock's foot and Timothy Grass.

- 112 Large White, *Pieris brassicae* L.**  
Expanse 2½ inches.

So common some years as to do great damage to cabbage and related crops, hence often called the Cabbage White. A migrant, which only survives the winter in small numbers in favourable situations. In a fine season there may be two or three broods. Kept under control naturally to a large extent by a tiny parasitic wasp, *Apanteles glomeratus*.

- 113 Green-veined White,**  
*Pieris napi* L. Expanse  
1½-2 inches.

Common throughout the British Isles except the extreme north. The spring brood, which flies in May is smaller, and duskier than the summer brood of August, and the males of both have only one black spot on the forewing. Caterpillar feeds on many of the cresses, rape, horse-radish etc.

- 114 Brimstone, *Gonepteryx rhamni* L.**  
Expanse 2½ inches.

Hatches out of the chrysalis in late summer, hibernates throughout the winter and takes to wing again in early spring, flying till June. Caterpillar feeds on buckthorn. Widespread in England and Wales; local and rather rare in Ireland.

- 115 Black-veined White,**  
*Aporia crataegi* L.  
Expanse 2½ inches.

Now extinct in the British Isles. Formerly it was common in most southern counties, and sometimes troublesome in orchards. The young caterpillars are gregarious and live in a shelter of silken webs on the leaves of sloe, hawthorn, plum etc.

- 116 Orange Tip,**  
*Anthocharis cardamines* L.  
Expanse 1½ inches.

The female lacks the orange patch which adorns the forewing of the male. Common in England and Wales, but rare in Scotland. One of the first butterflies to emerge in spring, in May. Caterpillar feeds on many Cruciferae such as Lady's Smock, hedge mustard and charlock.

- 117 Clouded Yellow,**  
*Colias crocea* Geoffroy  
Expanse 2 inches.

Only the male is illustrated. The female is less brilliant and has yellow spots in the black borders and has two colour forms; one is like the male, the other is very pale yellow and is the *helice* form. Very seldom survives the English winter; those seen in early summer are migrants which, in a favourable season give rise to a second brood in August and September.

- 118 White Admiral,**  
*Limenitis camilla* L.  
Expanse 2½ inches.

Flies in July in most large woodland areas in southern England, with a gliding flight. Caterpillar feeds on honeysuckle, preferring shade, and hibernates when very small. It was originally called the White Admirable.



**119 Red Admiral, *Vanessa atalanta* L.**  
Expanse  $2\frac{1}{2}$  inches.

A common butterfly in most seasons, but it does not regularly survive the winter. Reinforced annually by migrants from the continent, the first of which arrive in June. Most numerous in the autumn, when it is attracted by over-ripe fruit. Caterpillars feed on Stinging Nettles, each one constructing a kind of tent of leaves forming a shelter.

**120 Peacock, *Nymphalis io* L.**  
Expanse  $2\frac{1}{2}$  inches.

The first Peacocks usually appear on the wing in August, and are especially attracted to the flowers of Buddleia. Later, they visit over-ripe fruit and Michaelmas Daisies freely. They then go into hibernation till the following spring, and may often be seen till early May. The caterpillars feed gregariously on Stinging Nettles.

**121 Small Tortoiseshell,**  
*Aglais urticae* L. Expanse 2 inches

One of the commonest British butterflies. Those that appear in the autumn hibernate in barns and outhouses, re-appear in the spring, and give rise to a summer brood about July. The caterpillars feed gregariously on Stinging Nettles. Occurs throughout the British Isles.

**122 Camberwell Beauty,**  
*Nymphalis antiopa* L.  
Expanse  $2\frac{1}{2}$ -3 inches.

Occurs in the British Isles only as a very rare migrant believed to come from Scandinavia, possibly transported accidentally by ships importing timber. When freshly emerged, in early autumn, the wide wing borders are yellow; after hibernation, in the spring, they are generally whitish. The caterpillars feed on willow, sallow or birch

and are gregarious till nearly fully fed. Many attempts have been made to establish the Camberwell Beauty in England, but all have failed.

**123 Comma, *Polygonia c-album* L.**  
Expanse  $1\frac{3}{4}$ -2 inches.

Takes its name from the silvery C-shaped mark on the underside of the hindwing. Appears on the wing in early autumn, then hibernates and reappears in the spring. These spring butterflies give rise to a summer brood which flies in July. Caterpillar on hop, stinging nettle and currant. Restricted fifty years ago to the Wye Valley, it has since spread again through all the southern counties, most of the Midlands and even further north.

**124 Queen of Spain Fritillary,**  
*Issoria lathonia* L.  
Expanse  $1\frac{3}{4}$  inches.

This lovely butterfly is unfortunately only an exceedingly rare casual visitor to England, coming almost certainly from southern Europe. It has been seen in Kent more often than in any other county. The caterpillar feeds on wild pansy and dog-violet.

**125 Dark Green Fritillary,**  
*Argynnis aglaia* L.  
Expanse  $2\frac{1}{4}$ - $2\frac{1}{2}$  inches.

The female of this handsome swift-flying butterfly is rather larger than the male, with more rounded, paler wings and heavier markings. Flies in July and early August throughout the British Isles in localities where violets, on which the caterpillars feed, grow freely.

**126 Silver-washed Fritillary,**  
*Argynnis paphia* L.  
Expanse  $2\frac{1}{2}$ -3 inches.

Our largest British Fritillary. Flies in

July and August in most large woodland areas in the Midlands and southern England. Scarcer in the north and in Ireland. The female occurs, especially in Hampshire, in two forms, one much like the male in colour, the other (var. *valesina*) very much darker, almost olive-green. The caterpillar feeds in the spring on violets, after hibernating (without feeding at all) immediately after hatching from the egg.

- 127 **Scotch Argus**, *Erebia aethiops*  
Esper      Expanse  $1\frac{1}{2}$  inches.

Butterflies of the genus *Erebia* are characteristic of alpine regions. The Scotch Argus occurs in England only in the most northern counties, becoming commoner and more widespread in Scotland. It flies only when the sun is shining, in areas where the grasses grow, such as Tussock Grass, on which the caterpillars feed.

- 128 **Grayling**, *Satyrus semele* L.  
Expanse  $2\frac{1}{2}$  inches.

Flies in July and August particularly on rather rough hillsides, where it is fond of settling on the ground with its closed wings pointing directly at the sun. Its under side harmonises with the background and makes it very difficult to see. Locally common throughout the British Isles. Caterpillars feed on a variety of coarse grasses.

- 129 **Small Heath**,  
*Coenonympha pamphilus* L.  
Expanse  $1\frac{1}{2}$  inches.

Probably the commonest butterfly in the British Isles, occurring on grasslands everywhere, and on the wing from May to September. Caterpillar feeds on many kinds of grasses.

- 130 **Wall Brown**, *Pararge megaera* L.  
Expanse  $1\frac{1}{2}$ -2 inches.

Well-named from its habit of basking on hedge-banks, walls and stones. Flies in May and again in August (sometimes even later) throughout the British Isles except northern Scotland. Cock's foot grass is the main food of the caterpillar.

- 131 **Green Hairstreak**,  
*Callophrys rubi* L. Expanse 1 inch.

One of the first spring butterflies to appear, early in May. Its flight and colour make it difficult to see on the wing. Common where it occurs as a rule, and present throughout the British Isles. Caterpillar feeds on the flowers, buds and seeds of gorse and broom.

- 132 **Large Copper**,  
*Lycaena dispar* Haworth  
Expanse  $1\frac{1}{2}$  inches.

This brilliant shining copper-coloured insect used to be common, more than one hundred years ago, in the fen country, where its caterpillar fed on the Giant Water Dock. Its disappearance was due less to the drainage of fens than to the cupidity of collectors.

- 133 **Small Copper**, *Lycaena phlaeas* L.  
Expanse 1 inch.

Generally to be found on the wing in most of the summer months, in two or three broods, depending on the season. The midsummer butterflies are duskier than those of spring and autumn. Throughout the British Isles. Caterpillar feeds on Sorrel and Dock.

- 134 **Silver-studded Blue**,  
*Plebejus argus* L. Expanse 1 inch.

Derives its name from the silvery scales in the dark spots near the margins

of the underside of the hind wings. Local throughout the British Isles, but usually abundant where it occurs, which is chiefly on heathlands. Caterpillar feeds on the flowers of gorse and broom.

- 135 Chalk Hill Blue,**  
*Lysandra coridon* Poda  
Expanse  $1\frac{1}{2}$  inches.

Found only, as its name implies, in chalk or limestone country where the Horseshoe Vetch grows. Caterpillar feeds exclusively on this vetch. The female is usually entirely brown on the upper side, except for a few orange spots near the hind wing margin, but there are varieties bearing a variable amount of blue scaling on the upper side.

- 136 Death's Head Hawk Moth,**  
*Acherontia atropos* L.  
Expanse  $4\frac{1}{2}$  inches.

The largest British Moth, but only doubtfully native. Migrants from the south reach southern England during the summer months in most years and lay eggs on the Potato haulms. When the potatoes are lifted the pupae are turned up by the diggers; it seems unlikely that the moth survives the English winter. Another name for the Death's Head is Bee Robber, due to the fact that it sometimes raids beehives in search of the honey. Both the moth and its caterpillar are capable of making an audible squeaking noise. The moth derives its name from the markings on the thorax.

- 137 Eyed Hawk Moth,**  
*Smerinthus ocellatus* L.  
Expanse  $3\frac{1}{2}$  inches.

Flies, at night, during May and June. Found throughout the British Isles, except northern Scotland. By day rests with the eye spots of the hind wing

covered by the forewings. The long proboscis of the moth enables it to reach the nectar of tubular flowers, and in doing so it incidentally helps to pollinate them. The caterpillar feeds on the leaves of willow and sallow and sometimes apple trees.

- 138 Privet Hawk Moth,**  
*Sphinx ligustri* L.  
Expanse  $4\frac{1}{2}$  inches.

In Britain it is rarely found outside the southern counties of England, where it is not uncommon in June and July. The moth is much more rarely seen, however, than the very handsome caterpillar, which feeds chiefly on privet, but also on lilac and sometimes ash.

- 139 Pine Hawk Moth,**  
*Hyloicus pinastri* L.  
Expanse 2 inches.

Until recently only to be found in Britain in certain pine plantations in East Anglia. Now present in most of the southern counties of England, its spread probably helped by the extensive planting of coniferous trees in those counties in recent years. The moth flies during June and July, resting by day on pine trunks. Caterpillar feeds on the needles of pine.

- 140 Bedstraw Hawk Moth,**  
*Celerio galii* v. Rott.  
Expanse  $2\frac{3}{4}$ - $3\frac{1}{2}$  inches.

A rare migrant from southern Europe, reaching the British Isles occasionally in May but more often in late summer. The conspicuous caterpillar sometimes found wild feeding on bedstraw and, though generally green, may be brown and even black.

- 141 Elephant Hawk Moth,**  
*Deilephila elpenor* L.  
Expanse  $2\frac{1}{2}$  inches.

Found throughout England and Wales,

Ireland and southern Scotland in June. Visits flowers by night. Caterpillar feeds at night on willow-herb and bedstraw, especially in the neighbourhood of water; when disturbed it draws back its head, which causes the eye-like markings on its side to swell out, producing a snake-like appearance, though it is quite harmless.

**142 Puss Moth, *Cerura vinula* L.**  
Expanse 2½-3 inches.

The night-flying moth rests by day mainly on tree trunks. It is less often seen than its handsome caterpillar, which feeds on poplars and willows. When disturbed, the caterpillar raises its head and draws it back, at the same time whipping its forked tail from side to side. The whole sudden action has a decidedly frightening effect.

**143 Buff Tip Moth,**  
*Phalera bucephala* L.  
Expanse 2½ inches.

Occurs in June and July throughout the British Isles. When at rest, with the wings furled along its back it resembles a piece of broken twig. The caterpillars, which are gregarious until nearly full grown, feed on the foliage of almost any tree.

**144 Vapourer Moth,**  
*Orgyia antiqua* L.  
Expanse 1½ inches.

Particularly common in urban districts in the south, where its caterpillar feeds on a great variety of ornamental and shade trees. Less common in Ireland and Scotland. Flies during July to September. Female wingless. The tiny newly hatched caterpillars are sometimes distributed by the wind.

**145 Small Eggar,**  
*Eriogaster lanestris* L.  
Expanse 1½-1¾ inches.

Fairly widespread in southern England,

rarer in the north of Scotland. Flies in February and March. Female larger and stouter than the male. Caterpillars live gregariously on a web of silk spun over a branch of the hawthorn or sloe on which they feed.

**146 Black Arches,**  
*Lymantria monacha* L.  
Expanse 1½-2 inches.

Occurs in most woodland areas from Yorkshire southwards, in July and August. Caterpillar feeds on foliage of oak and other trees, in the bark of which it makes a cocoon before turning into a chrysalis. Though not troublesome in the British Isles, the Black Arches is a serious pest of forest trees in some continental countries.

**147 Fox Moth, *Macrothylacia rubi* L.**  
Expanse 2½-2¾ inches.

Throughout British Isles. The male flies wildly by day, seeking the female, in May and June, especially near open heathland. The larger female flies at dusk and evening. Caterpillar feeds on bramble, heath etc. and its hairs are irritating to the skin.

**148 Oak Eggar,**  
*Lasiocampa quercus* L.  
Expanse 2½-3 inches.

Common throughout the British Isles. In Scotland, Ireland and northern England it is darker than in the south and this variety is known as *callimae*. The moth flies in June, July or August, according to locality, and the caterpillar, which sometimes may take one or two years to reach full growth, feeds on hawthorn, blackthorn, heather and ivy.

**149 Emperor Moth,**  
*Saturnia pavonia* L.  
Expanse 2½-3 inches.

Throughout the British Isles, flying in

April and May, the male by day, the much larger and paler female at dusk. Prefers heath and marshland. Caterpillar feeds on great variety of bushes and shrubs, such as heather, bramble, willow and sloe; its tough cocoon is furnished at one end with stout fibres arranged in such a way that, though the moth can emerge easily, enemies cannot enter.

- 150 Heart and Dart,**  
*Agrotis exclamatoris* L.  
Expanse  $1\frac{1}{2}$  inches.

Very common except in northern Scotland. Flies in June and July. Caterpillar rests in soil and feeds on many low-growing plants such as grass, chickweed, plantain and turnip, sometimes being quite a pest, at night.

- 151 Setaceous Hebrew Character,**  
*Amathes c-nigrum* L.  
Expanse  $1\frac{1}{2}$  inches.

Abundant everywhere in the British Isles. Double brooded, flying in May and again in September, except in the north where it flies in June and July. Caterpillar feeds on dock, plantain, dandelion, chickweed etc. and hides in the soil by day.

- 152 Great Brocade, *Eurois occulta* L.**  
Expanse  $2\frac{1}{2}$  inches.

Found regularly in Scotland. Occasionally in England, even in the south, probably as migrants, in August. Caterpillar feeds in autumn on dandelion, knot grass etc. and in the spring after hibernation on low-growing willow, bramble etc.

- 153 Large Yellow Underwing,**  
*Triphaena pronuba* L.  
Expanse  $2\frac{1}{2}$  inches.

Common everywhere, often abundant. The main brood in June and July, often a partial second brood in August

and September. Caterpillar feeds on almost any low-growing plant and is often a pest in flower and vegetable gardens.

- 154 Broom Moth, *Ceramica pisi* L.**  
Expanse  $1\frac{1}{2}$  inches.

The colour of the forewings is a warm reddish brown. Flies in June and July throughout the British Isles. Caterpillar feeds mainly on broom, also on bramble, bracken, willow etc. on which it can often be found by day.

- 155 Feathered Gothic,**  
*Tholera popularis* F.  
Expanse  $1\frac{1}{4}$ - $1\frac{1}{2}$  inches.

Flies in August and September throughout England, Wales and Ireland; in southern Scotland local. The caterpillar feeds at night on matgrass and other similar grasses.

- 156 The Claddagh, *Luceria virens* L.**  
Expanse  $1\frac{1}{2}$  inches.

This lovely moth was not known to exist in the British Isles until it was found in 1949 in the Burren of Clare in western Ireland. The caterpillar feeds in and around the roots of various grasses and the moth flies in July.

- 157 The Shark, *Cucullia umbratica* L.**  
Expanse  $2\frac{1}{2}$  inches.

Flies by night in June and July. Rests by day on tree trunks, palings etc. where it is very difficult to see. Caterpillar feeds during July to September on sow thistle and allied plants.

- 158 The Sallow, *Cirrhia icteritia***  
Hufnagel Expanse  $1\frac{1}{2}$ - $1\frac{3}{4}$  inches

Flies in September. Very variable in its markings which may be much reduced in extent. Caterpillar feeds at first in willow catkins; afterwards on many low-growing plants. Common except in northern Scotland.



- 159 **Bird's Wing**,  
*Dypterygia scabriuscula* L.  
Expanse  $1\frac{1}{2}$  inches.

The popular name is based on the shape of the pale markings on the forewing. Common in southern England, rare or absent northwards. Flies in May and June, and the caterpillar feeds on dock, sorrel, knotweed and allied plants.

- 160 **Clouded Border Brindle**,  
*Apamea crenata* Hufnagel  
Expanse  $1\frac{1}{2}$ - $1\frac{9}{10}$  inches.

Common everywhere and often abundant. Flies in June and July and rather variable. Caterpillar feeds from August to April on almost any kind of low-growing plant.

- 161 **Copper Underwing**,  
*Amphipyra pyramidea* L.  
Expanse 2- $2\frac{1}{2}$  inches.

Flies from late July to September in the larger woodlands of southern England and Ireland, becoming rare or absent northwards. Caterpillar feeds in the spring on the foliage of most woodland trees.

- 162 **The Dunbar**, *Cosmia trapezina* L.  
Expanse  $1\frac{1}{2}$  inches.

On the wing in July and August. Common from southern Scotland southwards; rare to the north. Caterpillar feeds on most woodland trees and is also strongly cannibalistic.

- 163 **The Silver Y.**, *Plusia gamma* L.  
Expanse  $1\frac{1}{2}$  inches.

A well known migrant. Arrives sometimes in more than one wave during the summer. Commonest in late summer and autumn. Caterpillar feeds on almost any kind of low-growing plant.

- 164 **Burnished Brass**, *Plusia chrysitis* L. Expanse  $1\frac{1}{2}$  inches.

Occurs throughout the British Isles in July and August, fairly commonly. Caterpillar feeds on nettles and pupates in a cocoon on the leaves.

- 165 **Clifden Nonpareil**,  
*Catocala fraxini* L.  
Expanse  $3\frac{1}{2}$  inches.

Until recently a very rare migrant. Appears now to be established in one small area in Kent where it flies in July. Caterpillar feeds on aspen and poplar.

- 166 **Red Underwing**, *Catocala nupta* L. Expanse 3 inches.

Common in south and east England but rare or absent elsewhere. Often to be seen at rest on tree trunks with forewings covering the hind wings. Caterpillar feeds on poplar and willow.

- 167 **Orange Underwing**,  
*Brephos parthenias* L.  
Expanse  $1\frac{1}{2}$  inches.

Moth flies high during sunshine in March and April round birch trees, on which the caterpillars feed, firstly on the catkins, then the leaves. Northwards as far as southern Scotland.

- 168 **Large Emerald**,  
*Hipparchus papilionarius* L.  
Expanse  $1\frac{1}{2}$ -2 inches.

Flies in July through Britain, except northern Scotland, in woods and open country where birch, beech and hazel, on which the caterpillars feed, grow freely. Caterpillar hibernates when very small, on exposed twigs, and feeds up in the spring.

- 169 **Blood Vein**,  
*Calothyraxis amata* L.  
Expanse  $1\frac{1}{2}$  inches.

The thin diagonal red line, exposed

fully even when the insect is at rest, gives this moth its popular name. Common in southern counties, thence rarer northwards, in June and July. Caterpillar feeds on dock, knotgrass etc.

- 170 Purple-barred Yellow,**  
*Lythria purpuraria* L.  
Expanse  $\frac{3}{4}$  inch.

Only doubtfully British, two specimens having been taken once near Perth in 1861. Caterpillar said to feed on oak, blackthorn and sorrel.

- 171 Shaded Broad-bar,**  
*Ortholita chenopodiata* L.  
Expanse  $1\frac{1}{4}$  inches.

Common almost everywhere in July and August in rather open country: at one time known as the 'Aurelian's Plague'. Caterpillar feeds on clover, vetch, grasses etc.

- 172 Clouded Border,**  
*Lomaspilis marginata* L.  
Expanse  $\frac{7}{8}$  inches.

Generally common throughout Britain, except the extreme north, especially in moist places where salallows abound, principally in May and June. Caterpillar also on willow and aspen.

- 173 Winter Moth,**  
*Operophtera brumata* L.  
1 inch. (male).

The male flies in winter, mainly in December. The female is wingless, but after emerging from the chrysalis in the soil, climbs the trees on which she lays her eggs. It is to prevent this that greasebands are placed around the stems of fruit trees. In some years the caterpillars are so abundant that much damage is done to the foliage of the many trees, including fruit trees, on which they feed.

- 174 Magpie or Currant Moth,**  
*Abraxas grossulariata* L.  
Expanse  $1\frac{1}{2}$  inches.

Both caterpillars and moth are conspicuously coloured, warning predators that they are not very tasty. The moth occurs throughout Britain and is very variable. Caterpillar feeds on currant, blackthorn, gooseberry, euonymus etc.

- 175 Orange Moth, *Angerona prunaria***  
L. Expanse  $1\frac{5}{8}$  inches.

This extremely variable moth flies in July. Extends northwards as far as Yorkshire, but not commonly. The caterpillar feeds on blackthorn, privet, plum etc., pupating between leaves in June.

- 176 Mottled Umber,**  
*Erannis defoliaria* L.  
Expanse  $1\frac{1}{2}$  inches.

Male moth flies in October to December. The pattern of wing markings is very variable. Female is wingless. The brightly coloured looper caterpillar feeds in the spring on oak and birch, and many other trees and is often so abundant as to strip the young leaves completely.

- 177 Bordered White,**  
*Bupalus piniarius* L.  
Expanse  $1\frac{3}{8}$  inches.

Caterpillar feeds from August to October on pine needles and, with the great increase in the planting of coniferous trees, has already become a pest in some areas. The moth flies in May and June throughout Britain.

- 178 Garden Tiger, *Arctia caia*** L.  
Expanse  $2\frac{1}{2}$ -3 inches.

The very active turry caterpillar of the Tiger Moth is more familiar than the moth. Known as the Woolly Bear, it is frequently found feeding on a great variety of low-growing plants, especial-

ly in the spring after hibernation. The moth flies in July and August, and is generally common.

- 179 Clouded Buff, *Diacrisia sannio* L.**  
Expanse  $1\frac{1}{2}$  inches.

Inhabits open country such as heaths and mosses, throughout Britain. Male will sometimes fly by day, but the female seldom before dusk, in June and July. Caterpillar feeds on dandelion, dock, plantain and other low-growing plants.

- 180 White Ermine,**  
*Spilosoma lubricipeda* L.  
Expanse  $1\frac{1}{2}$  inches.

Common throughout Britain, the moth is frequently attracted to light at night, in June and July. Very active caterpillar suggests a small, pale Woolly Bear (see Tiger Moth) and similarly feeds on all kinds of low-growing plants.

- 181 Hornet Moth, *Sesia apiformis* L.**  
Expanse  $1\frac{1}{2}$  inches.

Very aptly named, for in flight this clear-wing moth may easily be mistaken for a wasp or hornet. It flies in May and June in southern and eastern England, rarely as far north as Scotland, and in Ireland. The caterpillar feeds in the roots and stems of poplar and takes two years to reach full growth.

- 182 Ghost Swift, *Hepialus humuli* L.**  
Expanse  $2\frac{1}{2}$ -3 inches.

Flies at dusk in grassy places, the male with a curious swinging flight, like a pendulum, to and fro, sideways; the female much less easily seen, in straight level flight. Caterpillar lives in the soil feeding on the roots of coarse grasses and other vegetation. The chrysalis makes its way to the surface of the soil when the moth is due to emerge. Common in all suitable localities.

- 183 Six-spot Burnet,**  
*Zygaena filipendulae* L.  
Expanse  $1\frac{1}{2}$  inches.

Widely distributed on chalk downs and rough hillsides where the trefoils, clover and similar plants grow on which the caterpillar feeds. Day-flying, conspicuous and rather sluggish. The silvery cocoons are conspicuous on grass stems.

- 184 Goat Moth, *Cossus cossus* L.**  
Expanse  $3-3\frac{1}{2}$  inches.

Occurs throughout Britain, except northern Scotland, the moth flying in June. Derives its popular name from its caterpillar, which has a very goat-like smell and tunnels the wood of elm, ash, willow, apple and even oak, taking three years to reach full growth.

- 185 Wax Moth, *Galleria mellonella* L.**  
Expanse  $1\frac{1}{4}$ - $1\frac{1}{2}$  inches.

Moth flies from July to October, locally in England and Ireland, at night. Caterpillar feeds on old honeycomb, in which it forms stout silk-lined burrows and later a tough cocoon.

- 186 Mill Moth or Mediterranean Flour Moth, *Ephestia kuehniella* Zeller** Expanse 1 inch.

Common in flour mills, granaries, bakeries etc. throughout Britain during most of the summer months. Caterpillars feed on flour, which they cover with silken webs, making the handling of the flour very difficult and otherwise spoiling it.

- 187 Green Oak Beauty,**  
*Tortrix viridana* L.  
Expanse  $\frac{3}{4}$ -1 inch.

Abundant in Britain at least to southern Scotland. Moth flies in June and July. In spring the caterpillars are sometimes so numerous as almost to strip the oaks. When full fed they descend to

the ground on silken threads to pupate.

- 188 Codling Moth, *Cydia pomonella* L.**  
Expanse  $\frac{1}{2}$  inches.

An important pest of apples, occurring wherever apples are grown. Moth flies at dusk in May and June and the female lays her eggs on the young fruits, into which the caterpillar, sometimes known as the Apple Worm, immediately bores.

- 189 Pea Tortrix, *Laspeyresia nigricana* Stephens**  
Expanse  $\frac{1}{2}$  inch.

Fairly common from southern Scotland southwards. Moth flies in June and July. Eggs are laid on or near the young pods of peas in which the caterpillar feeds.

- 190 Pine Tortrix, *Evetria buoliana* Schiffmuller** Expanse  $\frac{1}{2}$  inch.

Moth flies in July and August in pine woods but is commoner in the south than in Scotland. It is one of several very similar species the caterpillars of which bore in the young shoots of various pine trees, doing considerable damage.

- 191 Small Ermine, *Hyponomeuta evonymella* L.**  
Expanse  $\frac{3}{4}$  inch.

The caterpillars of the Small Ermes, of which there are several very closely related species, live in silken webs or tents which they spin over the young shoots and leaves of apple, plum, haw-thorn, euonymous and other trees, according to the species. They feed up in May and June and the moths fly in July and August in most English counties and in Ireland.

- 192 Apple Fruit Miner, *Argyresthia conjugella* Zeller**  
Expanse  $\frac{1}{2}$  inch.

Normally the caterpillar feeds in

berries of mountain ash, but sometimes mines the surface of apples. Moth occurs throughout Britain, in June and July.

- 193 Clothes Moth, *Tineola bisselliella* Hummel**  
Expanse  $\frac{1}{2}$  inch.

Female usually noticeably larger than the male, but less often seen. Damage to clothes, carpets etc. is caused by the caterpillars which feed on all kinds of woollen and hairy material. Moth flies normally in June and July, but in centrally heated houses it may breed all the year round.

## DIPTERA

### Flies, Mosquitos, Midges

- 194 Winter Gnat, *Trichocera hiemalis* Degeer** Expanse  $\frac{1}{2}$  inch.

Congregates in dancing swarms in winter, sometimes even when snow is about. Abundant everywhere. Larva in decaying vegetable matter.

- 195 Common Daddy Long Legs, *Tipula oleracea* L.**  
Expanse  $1\frac{1}{2}$ -2 inches.

Generally distributed in Britain in May and June, and often later. The very similar *Tipula paludosa* flies mainly in August and September. The larvae of both are known as Leather Jackets and often do considerable damage to lawns and pastures by feeding on the roots of grasses below the surface.

- 196 Spangle-winged Mosquito, *Anopheles maculipennis* Meigen**  
Expanse  $\frac{1}{2}$  inch.

Occurs throughout Britain in a coastal variety, *atroparvus*, and an inland form, *masseae*, the former being the more important as a potential carrier of malaria. Only the females 'bite'. The very characteristic resting attitudes of

the mosquito and of its larva are illustrated. Larvae in rather still, unshaded water.

**197 Common Gnat, *Culex pipiens* L.**  
Expanse  $\frac{1}{2}$  inch.

Abundant throughout Britain. Larva breeds in almost any stagnant water, especially if slightly contaminated with rotting organic matter. Only the females survive the winter, to breed again in the spring, and they rarely, if ever, bite man.

**198 Ringed Mosquito,**  
*Theobaldia annulata* Schrank  
Expanse  $\frac{1}{2}$ – $\frac{3}{4}$  inch.

The largest British mosquito and common everywhere. Breeds in stagnant ditches fouled by sewage, as in the neighbourhood of farms. Only the female survives the winter, hibernating in cellars, sheds, hollow trees etc. Only the female bites (as in all mosquitoes), and her bite is more vicious and more often poisonous than that of any of the other species.

**199 Hairy Moth Fly,**  
*Psychoda alternata* Say  
Expanse  $\frac{1}{2}$  inch.

The fly is often to be seen on windows, but is common out-of-doors in damp places. Larvae live in muddy places rich in decaying matter, such as sewage farms, waste pipes etc. Everywhere common.

**200 River Fly or Buffalo Gnat,**  
*Simulium reptans* L.  
Expanse  $\frac{1}{2}$  inch.

Male black, female greyish. The females bite man freely and are a great nuisance. Larvae live in running water, attached to stones by means of a kind of sucker at their hind ends. Widespread.

**201 Harlequin Fly,**  
*Chironomus plumosus* L.  
Expanse  $\frac{3}{4}$  inch.

Larvae of this very abundant fly are the familiar blood worms of water butts, stagnant pools etc. When not swimming with their curious twisting movement they inhabit tubular mud shelters on the bottom.

**202 Red-legged Bibio,**  
*Bibio pomonae* F. Expanse  $\frac{3}{4}$  inches

On the wing in summer and again in autumn, chiefly in hilly country. Larva lives in soil. The commoner St. Mark's Fly, so-called because it usually emerges about St Mark's Day, differs in being entirely black and often flies in swarms.

**203 Horse Fly or Gad Fly,**  
*Tabanus bovinus* L.  
Expanse  $1\frac{1}{2}$  inches.

A woodland and forest insect, the male visits flowers in search of nectar, but the female pierces the skin and sucks the blood of cattle, and will also on occasion attack people. Larva lives in moist soil and is predacious.

**204 Clegg, *Haematopota pluvialis* L.**  
Expanse  $\frac{3}{4}$  inches.

A vicious biter, which arrives quite silently and attacks man and beast. Common in southern England in wooded country from May to September. Larva lives in soil.

**205 Warble Fly, *Hypoderma bovis* L.**  
Expanse 1 inch.

The fly lays its eggs on the hairs on the legs of cattle, whence they are licked into the mouth. The young larva penetrates the skin and by degrees migrates through the host's body to come to lie finally just below the skin of the back, where it gives rise to a



swelling known as a warble. Sufficiently common to be of economic importance.

- 206 Common Horse Bot Fly,**  
*Gasterophilus intestinalis* de Geer  
Expanse 1 inch.

The fly lays its eggs on the hair of the horse's legs whence they are apparently licked by the horse into the mouth. Entering by way of the lips, they eventually attach themselves to the stomach lining, and when full-fed release their hold and are passed out with the horse's droppings. They then pupate in the soil.

- 207 Assassin Fly,**  
*Laphria marginata* L.  
Expanse 1 inch.

Does not seize its prey on the wing, but lies in wait and pounces on it, often capturing insects larger than itself which it appears at once to paralyse. Common in woodlands in southern England.

- 208 Large Bee Fly,**  
*Bombylius major* L. Expanse 1 inch.

When in flight greatly resembles a small hovering bumble bee. Appears in April and May, in southern England. Larva is a parasite feeding on the grubs of bees.

- 209 Swarming Hover Fly,**  
*Scaeva pyrastris* L. Expanse 1 inch.

Common in the British Isles, sometimes in swarms on the south coast, and generally distributed. Female often without yellow markings on body. The active spear-headed larvae are predacious on aphids and most useful in keeping them in check. Flies from May to October.

- 210 Drone Fly, *Eristalis tenax* L.**  
Expanse 1 inch.

Common in the British Isles. The larva

lives in liquid putrefying matter and is known as the rat-tailed maggot, the long tail being a breathing tube which is pushed above the surface of the liquid. The fly is so like a bee that it is probably the 'bee' which the ancients thought was 'generated' from the rotting body of a lion.

- 211 Vinegar Fly,**  
*Drosophila transversa* Fallen  
Expanse  $\frac{1}{2}$  inch.

The heavy slow flight is very characteristic of this species and its many close allies which frequent breweries and places where fermentation processes are carried on. Because they are very easily reared in captivity and breed rapidly they have proved an excellent subject for experimental research in genetics.

- 212 Flesh Fly, *Sarcophaga carnaria* L.**  
Expanse 1 inch.

Occurs throughout the British Isles between May and October. Female does not lay eggs, but young larvae, in decomposing or fresh flesh of almost any animal or in manure.

- 213 Green Bottle Fly,**  
*Lucilia caesar* L. Expanse  $\frac{1}{2}$  inch.

Generally common throughout the summer months. Fly lays its eggs on carcasses (sometimes on butcher's meat if not properly protected) and in two or three days the larvae are fully grown.

- 214 Blow Fly, *Calliphora vomitaria* L.**  
Expanse 1 inch.

A very common and troublesome fly, especially in hot weather, since it lays its eggs not only in carrion (its natural habit) but also in any meat to which it can gain access. The resultant maggots ('gentles') feed up very rapidly and

pupate within the hardened last larval skin.

- 215 Deer Bot Fly,**  
*Cephenomyia auribarbis* Meyer  
Expanse 1 inch.

The life history of this fly is like that of the Sheep Bot fly *Oestrus ovis*. The viviparous females deposit young larvae in the nostrils of the deer. The larvae live in the nasal or throat passages, attached by their mouth hooks, feeding on secretions of the host. When full-fed they loosen their hold and are ejected, to pupate in the ground.

- 216 House Fly, *Musca domestica* L.**  
Expanse  $\frac{1}{2}$  inch.

Breeds in almost any kind of moist kitchen refuse, rubbish dumps, if moist, and particularly manure. It is a danger to health through transporting disease germs as it flies from filth to food, which it contaminates. Breeds very rapidly during the summer months, but in Britain seems only able to survive the winter in well-heated premises such as hotel kitchens and restaurants and boiler rooms.

- 217 Lesser House Fly,**  
*Fannia canicularis* L.  
Expanse  $\frac{1}{2}$  inch.

Only very slightly smaller than the House Fly. The males have a very characteristic habit of flying round, 'patrolling', back and forth, rather slowly, around hanging lamps etc. indoors; the females, like the common House Fly, are more inquisitive in visiting foodstuffs. Breeds in rubbish heaps.

- 218 Forest Fly, *Hippobosca equina* L.**  
Expanse  $\frac{1}{2}$  inch.

This rather flat parasitic fly is found

chiefly in the New Forest where both sexes settle preferably on the more exposed and soft surfaces of forest ponies and cattle, and suck their blood. Their shape and claws enable them to move quickly, crab-wise, through the hairs of the host. The female is viviparous, giving birth to full grown larvae which at once pupate. On the wing from May to October.

- 219 Sheep Ked, *Melophagus ovinus* L.**  
Length  $\frac{1}{2}$  inch.

Also known as the Sheep-tick or Sheep-louse, this completely wingless fly passes its whole existence in the fleece of sheep. It looks more like a spider than a fly, and, like the Forest Fly, is viviparous.

## SIPHONAPTERA - Fleas

- 220 Dog Flea, *Ctenocephalides canis***  
Curtis Length 2-3 mm.

Usually darker than the human flea, almost black. Also distinguished by having a 'comb' of extra stout broad spines just behind the head. Its shape, flattened from the sides, and its strongly backwardly directed spines, enable it to slip through the hairs of its host and maintain a hold. The hind legs are specially developed for jumping. Rarely bites man, but occurs on cats as well as dogs.

- 221 Flea, *Pulex irritans* L.**  
Length 2-4 mm.

Lacks the 'comb' behind the head that distinguishes the Dog and Cat Fleas. Not nearly so common as it used to be. The grubs, like those of the Dog Fleas, are thin, maggot-like objects and live amongst organic refuse, such as accumulates in the cracks between floor boards and similar places.

## HYMENOPTERA

### Ants, Bees and Wasps

- 222 Honey Bee or Hive Bee,**  
*Apis mellifica* L. Length Male  
 16 mm; Female 15-20 mm,  
 Worker 10-13 mm.

There are many different strains or races of the Honey Bee, but none is native to Britain. The occasional 'wild' colonies that occur are escapes. Northern races are rather dark brown, those of Italy redder. The original home of the species was probably in the Near East, but now, owing to man's activities the hive bee is virtually cosmopolitan.

The male is readily distinguished by its very large eyes and 13-jointed antennae; the female or Queen has 12-jointed antennae, well separated eyes, and her long, rather pointed body projects beyond the wings when these are folded. The worker is the smallest of the three castes and has pollen baskets developed on its hind legs. It is the ubiquitous worker that is the most familiar caste. The drones, being males and therefore devoid of ovipositors, have no stings. A flourishing hive may contain 50,000 to 80,000 workers, one queen and a few hundred males. The queen, together with many of the workers survive the winter, living on the honey gathered in summer, or on sugar provided by the hive owner, but the drones are driven out on the approach of winter. The honeycomb is constructed of wax which is secreted by pores on the underside of the bee's body, and a resinous substance called propolis, collected from the buds of trees. The female lays a single egg in each brood cell, and the young larvae are at first fed on a special diet secreted by the workers, later on honey and digested pollen. The royal cells, in which queens develop, are larger

than those of the workers and drones and rounded rather than hexagonal, and the larvae in them are fed on a special diet. The members of a colony are considered to be held together and to recognise each other through a secretion of the queen's, called queen substance, which pervades the whole nest and is shared by all its inhabitants. Lately it has been shown that the workers can communicate information to each other as to the distance and direction of sources of nectar by curious dances, which they perform within the hive.

- 223 Early Mining Bee,**  
*Andrena albicans* Muller  
 Length 8-11 mm.

Common in southern England and not very particular as to the kind of soil in which it sinks its shafts. From these shafts there branch off cells which the Bee stores with honey and pollen for the use of the grub that emerges from the single egg deposited in each. The bee appears in early spring, as soon as the willow catkins open and the colt's foot flowers.

- 224 Patchwork Leaf-cutter Bee,**  
*Megachile centuncularis* L.  
 Male 8-10 mm, Female 11-12 mm.

The leaves chiefly cut out by this Bee are those of rose trees. The neatly cut pieces are used to make cylindrical brood cells, usually five or six, one above the other in burrows in earth or rotting wood. Most active in June and July.

- 225 Hill Cuckoo Bee,**  
*Psithyrus rupestris* Fab.  
 Length Male 15-18 mm, Female  
 18-25 mm.

The smoky wings and the absence of pollen-carrying apparatus on the hind legs distinguish this bee from the

Redtailed Bumble Bee (Plate 52 : 1) on which it is parasitic. It forces its way into the nest of the host, often killing the mother bee, but not the workers, whose services are needed to feed its offspring.

**226 Buff-tailed Bumble Bee,**

*Bombus terrestris* L.

Male 16-18 mm, Female 16-22 mm, Worker 10-16 mm.

The nest of this large and common Bumble Bee is started in the early spring by a female which has hibernated after the males and workers died off in the autumn. It usually is made in a hedge bank or the old nest of a shrew or field mouse, and consists of pieces of grasses and debris. In the centre the bee makes a kind of platform of pollen and honey on which she lays a batch of eggs. So soon as this first batch of workers has developed, the queen lays further batches and the workers begin to take over the nest, which grows gradually larger till the advent of colder weather brings activity to an end. The species is found throughout Britain and performs most valuable service to man as a pollinator, especially of lucerne and red clover.

**227 Red-tailed Bumble Bee,**

*Bombus lapidarius* L.

Male 14-16 mm, Female 20-21 mm, Worker 10-14 mm.

Appears on the wing about mid May, rather later than *Bombus terrestris*. Common generally though rare or absent in northern Scotland. Its life history is very similar, but it perhaps visits a wider variety of flowers.

**228 Common Carder Bee,**

*Bombus agrorum* Fabricius.

Male 13-15 mm, Female 10-14 mm, Worker 17-19 mm.

Common throughout the British Isles,

nesting always on or above the ground, even in old pots and pans. The life history closely resembles that of other species of *Bombus*.

**229 Big-headed Digger Wasp,**

*Ectemnius cavifrons* Thomson.

Expanse 1 inch.

Flies in June, July and August throughout Britain. Makes its cells singly in rotten wood and provisions them with flies, especially blue and green-bottle flies.

**230 Wall Mason Wasp,**

*Odynerus parietum* L.

Expanse 1 inch.

Makes a nest of mud cells in cracks in walls, window frames, loose brickwork etc, often as many as ten or more at a time. Provisions the cells with paralysed caterpillars for its grubs to feed on. Common in most parts of the country.

**231 Hairy Sand Wasp,**

*Podalonia viatica* L.

Length 15-22 mm.

A robust handsome species with a furry appearance, burrowing in sandy places. Provisions its nest with large caterpillars (sometimes larger than itself) of the kind that hide by day in or near the surface of the soil, such as cutworms. A southern species, on the wing in spring and early summer.

**232 Red-banded Sand Wasp,**

*Sphex sabulosa* L.

Length 12-20 mm.

Like the previous species this wasp provides for its offspring a larder composed of large caterpillars; however, instead of first finding the caterpillar, then burying it, it does its excavation first then drags its prey to it. Only one egg is laid in each shaft dug. Not uncommon in sandy places,

even by the sea above high water mark.

**233 Red-banded Spider Wasp,**  
*Anoplius fuscus* L.  
Length 10-15 mm.

A common species in sandy places, from April to August. It hunts spiders, which it stings and paralyzes. It then drags them to suitable spots in which to sink shafts for their burial. When satisfied, the wasp lays an egg on the still living spider and fills in the shaft above it with sand and pebbles. Finally it covers up the disturbed area with miscellaneous debris.

**234 Common Wasp, *Vespa vulgaris* L.**  
Length 11-20 mm.

Like many bees, wasps have evolved a caste system of males, females and workers. Of these the females are much the largest, and alone survive the winter to carry on the species. Every queen wasp killed in the spring therefore means one less wasps' nest. Males can be recognised by their longer antennae. The nest is usually made underground and is roughly spherical, is built of wood pulp, and is suspended very often from the root of a tree. It consists of an outer covering, often of several layers, enclosing several horizontal combs of hexagonal cells which open downwards. In these cells the brood is reared, the cells being closed below when the grub is full-fed. The process of building up the nest and its population from the first few workers raised by the queen, is a slow one, which accounts for the fact that wasps are seldom numerous until late summer or autumn. There are several common wasps of the genus *Vespa* in Britain so much alike as to be confusing even to the expert. All are attracted to sweets, though in the main they are predacious

on other insects. Only the females and workers can 'sting'.

**235 Hornet, *Vespa crabro* L.**  
Length 20-35 mm.

This large wasp can at once be recognised by its size and dull reddish-brown colouring. It usually makes its nest in hollow trees. Though its sting is very painful, it is generally less aggressive than the common wasps. It occurs in most southern and midland counties and often flies at night, coming to street lamps and the lights of houses.

**236 Heath Potter Wasp,**  
*Eumenes coarctata* L.  
Length 11-14 mm.

The popular name is based on this little wasp's habit of building round, flask-like mud cells for her offspring. Usually a stiff twig near the ground is chosen, sometimes stones or palings. Each cell is provisioned with small caterpillars which have first been stung, and then a single egg is suspended inside before the cell is closed. Fairly common in southern England, especially on sandy heaths.

**237 Wood Ant, *Formica rufa* L.**  
Length 6-11 mm.

The largest British ant, and to be found in most woodlands throughout the country, especially in pine woods, where its large nests of pine needles and other fragments are often conspicuous, rising sometimes to a height of several feet. The main nest, however, consists of galleries and chambers below ground. It is a pugnacious creature, and when disturbed will not only bite but also discharge a droplet of stinging formic acid. Each nest contains several queens besides the males and innumerable workers. Swarming takes place in June, and mating



occurs on the ground, not in the air. The wood ant is omnivorous, capturing insects, feeding on nectar and honeydew (the sweet excretion of aphids) and also the seeds of many plants. Many other insects, mites and other creatures share their nest with the ants, especially beetles. Some are merely tolerated; others are tended by the ants in return for their secretions which the ants eagerly seek.

- 238 Jet Ant,**  
*Lasius fuliginosus* Latreille  
Length Male and Worker 4-6 mm, Female 6-8 mm.

Nests principally in old trees, or among their roots, several nests often being connected by underground tunnels. Has a noticeable and not unpleasant odour, and makes well-defined tracks to the sources of its food supplies, which are mainly the excretion of aphids, insects and seeds. It frequently raids the nests of other ants and carries off their pupae. Occurs northward as far as Yorks and Lancashire.

- 239 Small Black Ant,**  
*Lasius niger* L.  
Length Male and Worker 3-5 mm, Female 8-9 mm.

Abundant throughout Britain and also known as the Garden Ant, owing to its liking for nesting under the stones of rockeries, paths etc. Frequently invades houses in search of sweet substances such as sugar and jam. Swarms in July and August, and when this occurs in towns and cities, as often happens, generally causes quite unnecessary consternation. Omnivorous in habit, feeding on seeds, nectar, insects and the secretions of aphids both harboured in the nest and free-living on plants near the nest.

- 240 Yellow Ant, *Lasius flavus* F.**  
Length Male 3-4 mm, Female 7-9 mm, Worker 3-5 mm.

Occurs throughout Britain, abundantly, nesting chiefly in fields, where it raises the earthy mounds often mistaken for mole-hills. Appears to live almost exclusively on the excretions of aphids and scale insects which inhabit its nest, but it also 'milks' the caterpillars of the Chalk Hill Blue Butterfly.

- 241 Pharaoh's Ant,**  
*Monomorium pharaonis* L.  
Length 2-2.5 mm.

A cosmopolitan ant, in England confined entirely to houses, especially well-heated buildings, where it can become a serious pest. Feeds voraciously on sweets, cake, also meat, butter and fats. A marriage flight (winged swarm) has not been seen in England.

- 242 Red Ant, *Myrmica rubra* L.**  
Length 3-6 mm.

Nests under stones or forms small thyme-covered nests on the surface, or even in tree stumps. Carnivorous, attacking other ants and insects; also has a fondness for sweet substances such as the honeydew of aphids, some of which live in its nests. Several different kinds of ants are probably confused under the name of 'Red Ant'. One of them carries off the young caterpillars of the rare Large Blue Butterfly and tends them in its nest.

- 243 Ruby-tailed Wasp,**  
*Chrysis ignita* L. Length 6-9 mm.

This dazzlingly beautiful little wasp can sometimes be seen sunning itself on hot walls and stones. Its beauty belies its habits, for it parasitises the wall Mason Wasp (*Odynerus parietum*, Fig. 230), its grub consuming the food store laid up by the Mason Wasp for its own offspring.

- 244 Cherry Gall,**  
*Cynips quercusfolii* L.  
 Expanse  $\frac{1}{2}$  inch.

Causes round galls that appear on the ribs on the underside of oak leaves in the autumn, each containing one larva of the gall-wasp. In late autumn there emerge from these galls females only, which lay eggs in the resting buds of the oak. The larvae hatching from these give rise to violet 'egg' galls in spring, which are only two to three millimetres long and thus very small when compared with the cherry galls of the alternate generation. From these insignificant galls both males and females emerge about the end of May, the females laying eggs on the oak leaves to produce the Cherry Galls once again.

- 245 Robin's Pin Cushion,**  
*Rhodites rosae*, L. Expanse  $1\frac{1}{8}$  inch.

The characteristic galls made by this gall wasp are familiar on rose bushes, particularly wild roses. The wasp has no popular name, being known, as is usually the case, by the name applied to the gall its larvae produce. Known also as the Bedeguar. There are several, sometimes many larvae, in each gall; and there is no alternate generation like that of the Cherry Gall.

- 246 Horn-tail Ichneumon,**  
*Rhyssa persuasoria* L.  
 Expanse  $1\frac{1}{2}$ - $1\frac{3}{4}$  inches.

The largest British 'Ichneumon Fly'; it is actually a parasitic wasp. When in action, with antennae waving in front and ovipositor stretched out behind, it measures fully  $3\frac{1}{2}$  inches. With its ovipositor it drills through the bark and solid wood of pines to lay an egg in the larva of the Giant Wood Wasp, *Sirex gigas*, (Fig. 249). How it locates this larva is not known. Local, but widely distributed in pine woods.

- 247 Yellow Ophion, *Ophion luteus* L.**  
 Expanse  $1-1\frac{1}{2}$  inches.

Parasitises the caterpillars of the larger moths. Flies at dusk and later, often invading houses. Common in most areas.

- 248 Cabbage White Wasp,**  
*Apanteles glomeratus* L.  
 Expanse 5 mm.

The tiny yellowish silken cocoons often found surrounding a dead Cabbage White caterpillar are made by the grubs of this very small wasp after leaving the 'host' in which they have fed. The wasp is an important natural control on the butterfly.

- 249 Giant Wood Wasp, *Sirex gigas* L.**  
 Expanse Male  $1\frac{1}{2}$  inches. Female  $2\frac{1}{4}$  inches.

Often mistaken for a hornet, but not a true wasp, as the absence of a waist indicates, and devoid of a 'sting'. The female bores in the wood of unsound pine trees with her ovipositor, and there lays an egg from which emerges a grub that tunnels in the wood for several years before becoming fully grown. Found throughout the country in pine woods, but never common.

- 250 Steel-blue Wood Wasp,**  
*Sirex juvencus* L.  
 Expanse  $1\frac{1}{2}$ - $1\frac{3}{4}$  inches.

Life history similar to that of the Giant Wood Wasp. In pine woods in England and Scotland. Not a native species, but now established in Britain. Often introduced with timber.

- 251 Willow Sawfly, *Pteronidea salicis* L.** Expanse  $2\frac{2}{3}$  inches.

One of the many kinds of sawflies that attack the foliage of willows. The larvae, which are like caterpillars but have more legs, skeletonise the leaves. Sawflies are so named because the

female's ovipositor has a saw-like edge with which she cuts plant tissues when egg-laying. Common.

**252 Yellow Cimbex, *Cimbex lutea* L.**  
Expanse  $1\frac{1}{2}$ -2 inches.

The caterpillar-like larva is to be found on willow and poplar throughout England and Scotland from May to July.

**Protective Resemblance - Mimicry**

**253-261 Examples of Protective Resemblance**

Figures 253 to 257 show examples of insects which escape detection when at rest by resembling and 'melting' into their background. In figures 258 to 261a Clearwing Moth and a two-winged Hover Fly are shown which look deceptively like the Common Wasp and so gain protection from their enemies by 'flying under false colours'. Most of these are described elsewhere, and cross-references are as follows:

- 253 see No. 71
- 255 see No. 128
- 258 see No. 181
- 259 see No. 209
- 260 see No. 234

**Migrants and Casual Visitors**

In the British Isles no insect is protected by law, as is the case in some continental countries. However, as certain rare and local species appeared to be threatened with extinction for one cause or another, the Royal Entomological Society of London drew up and published in 1951 a list of Butterflies and Moths which it asked entomologists to refrain from catching and to protect in whatever way they could. The appeal met with a very satisfactory response. Only one of the species listed is illustrated in this book, namely the Swallow-tail Butterfly

(*Papilio machaon*). One other, Blair's Wainscot, has already become extinct it is feared, for its only known habitat was largely destroyed when it was greatly in demand by collectors—a combination of circumstances to which the loss of many insects that formerly inhabited these islands can certainly be attributed.

**262 New Zealand Stick Insect,**  
*Acanthoxyla prasina* Westwood  
Length  $3\frac{1}{2}$  inches.

This prickly stick insect was first found in England at Paignton, South Devon, in 1908. It is a native of New Zealand and it is considered almost certainly to have been imported to Paignton and the Scilly Isles (where it is also found) with growing plants brought from New Zealand in 1907. It should be looked for on such plants as roses, brambles and raspberries. As it seldom moves by day it is best sought with a lamp at night.

**263 Red-veined Dragonfly,**  
*Sympetrum fonscolombii* Selys  
Expanse  $2\frac{1}{2}$ - $2\frac{1}{2}$  inches.

A very rare visitor to the British Isles which sometimes succeeds in establishing itself for two or three years. It generally arrives in July, if at all, and is strongly migratory in habit, ranging over the whole of Africa, Europe and much of Asia. The adults affect rather boggy ponds, and in such places the nymphs have been known very rarely to breed.

**264 Banded Hover Fly,**  
*Volucella zonaria* Poda  
Expanse  $1\frac{3}{4}$  inches.

This large and handsome Hover Fly might well be mistaken on the wing for a bee or wasp. Formerly a great rarity, in recent years it has become established in a number of southern

counties, from Essex to Gloucestershire. The larva lives as a scavenger in the nests of bees and wasps.

**265 Bath White, *Pontia daphidice* L.**  
Expanse 2 inches.

The Bath White is a native of the Mediterranean countries and the Near East, in some of which it is on the wing all the year round. It is rather a wanderer, but very rarely reaches the British Isles unless climatic conditions are particularly favourable. A second generation has been known to result from early migrants, as there is no lack in this country of the various cresses on which the caterpillars feed.

**266 Milkweed Butterfly,**  
*Danaus plexippus* L.  
Expanse 4 inches.

How this handsome butterfly, which is a native of North America, reaches the British Isles is still rather a mystery. It is certainly a great migrant, having at one time spread throughout the Pacific Islands. But the crossing of the Atlantic would seem too heavy a task even for such a strong flyer. It is now

thought that it generally makes the passage accidentally with the cargo in holds of ships, as most of the captures in England are concentrated near the ports. The caterpillar feeds on various milkweeds, none of which is a native British plant.

**267 Colorado Beetle**  
*Leptinotarsa decemlineata* L.  
Length 10 mm.

This serious and voracious pest of potato crops reached Europe from America and has now spread throughout most of western Europe. It is very easily recognised, fortunately, both as larva and adult. It passes the winter so deep in the soil that ordinary cultivation does not disturb it. In a bad outbreak the whole of the haulms may be stripped and eaten. Occasionally reaches Britain, probably through accidental importation, but possibly carried by strong winds (it is a strong flier) from the continent. Constant watch should be kept on potato fields, especially in southern England, and the discovery of the beetle or its grub at once reported to the Police.

## SHORT BIBLIOGRAPHY

Since 1634, when the first work on British insects, *Insectorum sive minimorum Animalium Theatrum* by Thomas Moffett, was published, a great many others, ranging from the highly specialised scientific treatise to the purely popular, have made their appearance. Great additions to knowledge have also been made known through the publications of scientific societies. The volume of information now-a-days available is therefore extensive, yet it by no means covers the whole field. Though a great deal has been written of such popular insects as butterflies and moths, little is still known of the natural history of many of the more obscure kinds such as the smaller flies, the parasitic wasps and certain groups of beetles. The reader who wishes to learn more about British insects may find the works listed below useful.

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A series of more specialised *Handbooks for the Identification of British Insects* is in course of preparation by the Royal Entomological Society of London, but is not yet complete. Other books, in considerable variety, are available at most good booksellers.



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